THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The tendency of prices is upward, but the volume of business done at the higher figures is not sufficient to give them great significance. In pig iron current business is almost entirely in foundry grades, and while it is probable that one-fifth to one-fourth of the foundry iron to be needed this year is yet to be bought there is none of the excitement that accompanied the heavy buying in February. The three Southern furnace companies that have acted together to prevent a runaway market are to be credited with whatever of moderation the foundry iron market has preserved. If they did not succeed in holding prices at a given level their course has quieted the feverish conditions that were apparent. It is stated this week that the agreement to maintain a $12 basis on No. 2 foundry is now ineffective and that when the furnaces parties to it resume selling it will be at figures to be determined by each company for itself. All have been selling in the East at prevailing prices, generally $15 to $15.50 at Birmingham for No. 2, while remaining out of the Centeral Western market. Meantime producers and consumers are having trouble in plenty to maintain any regularity in the delivery of iron to foundries. Furnaces are quite behind on their contracts and current business is largely from disappointed foundrymen who are paying fancy prices to keep running. Steel-making pig iron has advanced as the scarcity of steel has become more marked. A sale of 5,000 tons of Bessemer iron for third quarter delivery was made at $20 at Valley furnace. In basic iron a sale of 3,000 tons, delivery running to July 1, is reported at $19.25 Pittsburg. It is not probable that Bessemer iron will be imported by leading steel interests, foreign prices being at a prohibitive point. The change of a furnace from spiegel to Bessemer iron will relieve the situation in the Pittsburg district. Only a week remains before the date set by the union of blast furnace workers in the Valleys for the enforcement of the three-turn system. At some Valley furnaces the men are still unorganized and the movement has no standing in Pittsburg. The labor leaders announce that no further notice will be given beyond that given in newspapers and intimate that work will stop if the eight-hour turn is not granted. At this writing a prediction cannot be made, but the situation has possibilities of at least a partial suspension of work. There is again some figuring on the importation of steel. One lot of 4,000 German sheet bars is reported under negotiation for delivery in the second half. Domestic billets are sold at $33 Pittsburg in small lots. Foreign billets can be delivered at about $32. The inadequacy of the domestic supply of rails is more marked. Relaying rails 60 to 70 pounds have brought $28, the contract price of new rails, and the available supply of relaying rails is in few hands, a Cincnnati concern being credited with buying a considerable tonnage. The plate mills are getting filled up and for early delivery $2 a ton above the pool price is obtained. The volume of structural work grows each week with increasing probability that contract deliveries will not be met. The American Bridge Co. has taken the contract for the Mississippi River bridge, calling for 13,000 tons of material. Apart from plates the advances of the week have been in heavier sheets, $3 a ton, and in boiler tubes, about 5 percent.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, April 23.

While high prices are ruling on pig iron the anxiety noticeable since the first of the year on the part of consumers seems to have disappeared entirely and the week has been particularly quiet so far as the buying of foundry and forge irons is concerned. There has been little doing in Bessemer iron for the reason that little if any iron is to be had this side of October and for delivery the fourth quarter of the year present quotations seem to be too high for many of the steel mills. There is now no expectation whatever of the United States Steel Corporation importing foreign Bessemer, for the reason that the English market is entirely too high. To provide for the present shortage one of the furnaces at the Edgar Thomson plant has been changed from ferro-manganese and is now operating on Bessemer. This will add to the corporation's tonnage fully 15,000 tons per month, and it is believed will tide over the shortage for the next few months.

In finished lines the market continues quiet and there is little or no buying to cover future requirements. In steel bars there is considerable activity, but it is limited to small lots almost entirely. The plate market continues strong and few if any of the mills are in shape to make deliveries in less than two months. As a result premiums continue to be paid for prompt deliveries. The merchant pipe market is very active, the buying being much heavier than it has ever been at this season of the year. The demand for relaying rails is also very heavy and one Cincinnati concern, which is reported to have secured 15,000 tons of rails, is asking $28 a ton for 60 and 70-pound sections. There is also a good demand on the part of some railroads for 80-pound sections, but this section has not been in use long enough to put any relaying rails on the market.

The strike of the miners of the Pittsburg & Rochester Coal Co. has been adjusted and the men have all returned to work. The coke ovens in this region have also been put in operation again and the furnace depends on this district for coke are suffering no longer. The proposed meeting of Valley furnace operators, which was talked of for last week, was not held for the reason that many operators did not deem it advisable to recognize the demands of the men until officially notified of the same. Otherwise the situation at the furnaces remains unchanged. The union workers are still insisting on an 8-hour day on May 1 and threaten to strike unless their demands are granted.

The annual convention of the Amalgamated Association of Iron and Steel Workers, which is in session at Wheeling, W. Va., has thus far developed nothing of interest to the iron trade. The scales have been signed and the question now is whether the convention will ratify the action of the executive officers.

At a meeting of the heads of the transportation departments of the companies of the United States Steel Corporation with the officials of the Pennsylvania railroad the question of providing for better terminal facilities was discussed at length. The proposed improvements to be made in this district to the mills of the United States Steel Corporation mean an additional 5,000,000 tons of freight annually and the Pennsylvania railroad company has promised to provide all facilities required.

PIG IRON.—The Bessemer iron market continues to advance at a rapid rate and we note the sale of 200 tons for delivery during May at $20 at the furnace, or $20.75, Pittsburg. For delivery through the remainder of the year the operators are holding their product at $19 at the furnace and are not showing any anxiety to sell at that price. We can also report the sale of 3,000 tons of basic iron on a basis of $19.25, Pittsburg, for delivery to July 1. There is little doing in foundry iron and as a result sales for delivery the remainder of the year have been few. We note the sale of 500 tons for delivery through the second half at $21.25, Pittsburg. We note no sales of forge iron, which is held nominally at $20, Pittsburg. We revise quotations as follows:

Bessemer, Valley	$19 00 to	20 00
Bessemer, Pittsburg	19 75 to	20 75
No. 1 Foundry	21 00 to	22 00
No. 2 Foundry	20 75 to	21 50
No. 3 Foundry	19 50 to	20 00
Gray Forge, Pittsburg	19 50 to	20 00
Chilled Basic, Valley	18 00 to	18 50
Chilled Basic, Pittsburg	18 75 to	19 25

STEEL.—Domestic steel is again somewhat higher than foreign steel delivered and owing to the great scarcity of domestic Bessemer there is every indication of considerable buying of foreign steel during the next few weeks. Bessemer billets in 100-ton lots have sold during the week at $33 a ton, while foreign steel can be laid down at Pittsburg at $32 per ton. However, prompt deliveries cannot be promised at this time, and it is doubtful if steel contracted for at present with German producers can be laid down at tidewater short of June. Bessemer rods continue firm at $36 to $37 per ton.

FERRO-MANGANESE.—There has been no change in the price of domestic ferro and we quote 80 per cent at $52.50 per ton, delivered at buyer's mill. Foreign manganese is quoted at $50 per ton for 80 per cent. Grades containing a smaller percentage of manganese are being offered at slightly lower prices.

SPELTER.—There was a sharp decline in the price of spelter during the week and we quote prime western grades at 4.25c, Pittsburg.

MUCK BAR.—Muck iron remains firm and all the mills are asking $33 to $33.50 per ton for their product. We note the sale of 500 tons at the latter figure.

SKELP.—The skelp market continues quiet and prices remain unchanged as follows: Grooved and sheared steel, 2c to 2.05c; iron, 2.05c to 2.10c.

RAILS AND TRACK MATERIAL.—The demand for standard section seconds is very heavy, but inasmuch as only small lots can be secured, are not suitable for large railroad work. Quotations remain unchanged as follows: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 pounds, $45; 12 pounds, $42; 16 pounds, $39; 20 pounds, $37; 20 pounds, $35; 20 to 40 pounds, $33. Track material: Spikes, 2c to 2.05c; track bolts, square heads, 2.50c; hexagon heads, 2.65c; fish plates, 1.60c.

PLATES.—The plate market rules strong and the demand is heavy. For prompt shipment Eastern mills continue to ask an advance of $2 per ton over agreed quotations. Prices are unchanged as follows: Tank plate, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches wide, 5c extra 100 pounds. Plates 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

BARS.—Considerable new business continues to be placed in steel bars in small lots and for prompt shipments premiums continue to be secured. Iron bars for prompt shipment are also quoted at a premium of $2 per ton. We make the following quotations: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer under three inches, 1.70c; over three inches, 1.80c; bar iron, 1.70c to 1.80c, Pittsburg, with full freight added to point of delivery. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots; refined iron bars, 2c and upwards.

PIPES AND TUBES.—Demand for all kinds of merchant pipe, tubing and casing, continues strong and independent manufacturers as well as the National Tube Co. are crowded with orders. A slight advance has been made in the price of boiler tubes. We quote the following discounts to jobbers, in carload lots, Pittsburg:

	Black. Per cent.	Galv. Per cent
⅛ to ⅜ and 11 to 12 inches	60	48
½ to 12 inches	67	55

Discounts below are to consumers, carload lots, Pittsburg:

BOILER TUBES.

Steel.

	Per cent.
1 to 1½ inches	45
2¼ to 5 inches	63½
1¾ to 2¼ and 6 to 13 inches	58

Iron.

	Per cent.
1 to 1½ and 2¼ inches	39
1¾ to 2¼ inches	38
2¾ to 13 inches	48

CASING.

	S. and S. Per cent.
2 to 3 inches	58
3¼ to 4 inches	63
4¼ to 12½ inches	65

SHEETS.—Sheets for heavy stamping purposes are in big demand and sheet mills are securing from $3 to $4 a ton above ruling quotations for this special quality. Ordinary blue annealed sheets are in good demand. We make the following quotations: Nos. 10 and 12, 2.40c to 2.50c; 14 and 15, 2.50c to 2.60c; 16, 2.60c; 18 and 20, 2.70c to 2.80c; 22 and 24, 2.80c to 2.90c; 26, 2.90c to 3c; 27, 3c to 3.10c; 28, 3.10c to 3.20c; 29, 3.25c to 3.35c; 30, 3.35c to 3.45c. Galvanized sheets, in carload lots to consumers, are quoted at 3.05c for Nos. 10 and 11, 3.15c for Nos. 18 to 21; 4.20c for No. 27, and 4.50c for No. 28. Galvanized sheets, mill shipments in carload lots, are as follows: No. 14, 3.06c; No. 16, 3.18c; No. 20, 3.38c; Nos. 22 and 24, 3.69c; No. 26, 3.95c; No. 27, 4.20c; No. 28, 4.47c. Quotations on mill shipments in less than carload lots are as follows: No. 14, 3.25c; No. 16, 3.35c; No. 20, 3.56c; Nos. 22 and 24, 3.88c; No. 26, 4.15c; No. 27, 4.40c; No. 28, 4.67c. For shipment from warehouse jobbers ask 5 cents per hundred above the latter quotations, which may be considered the quotations to the average consumer.

STRUCTURAL MATERIAL.—A large amount of business is being offered the mills, but little is being taken owing to the fact that proper deliveries cannot be promised. As yet there has been very little structural material imported and owing to the difference in the sections the indications are that very little will be brought into the country this summer. It is altogether probable that much structural work will be deferred to next year. The minimum dealers are asking on shapes for delivery from stock is 3 cents a pound and for shapes cut to length as high as 3.5c is secured. Agreement quotations remain unchanged as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 6 inches, 1.60c; universal mill plates, 1.60c.

WIRE AND WIRE NAILS.—A meeting of the wire and wire nail manufacturers will be held next week, but the indications are that no changes will be made in quotations. The spring business has been extraordinary thus far and exceeds the bookings of any previous year. Our quotations unchanged are as follows: Wire nails in carload lots, $2.05 per keg; smaller lots, $2.10 and $2.15; plain wire, $2 in carload lots and $2.10 in less than carload lots to retailers; galvanized wire, $2.40 in carload lots; polished staples, $2.20, and galvanized staples, $2.60; painted barb wire, $2.60, and galvanized, $2.90. These prices are quoted on a Pittsburg base, plus the actual freight to destination. Cut nails are held at $2.05 in carload lots and $2.10 in less than carload lots, Pittsburg, plus freight to destination.

MERCHANT STEEL.—Demand for all kinds of steel continues strong and the tool steel manufacturers report an excellent demand, with an immense tonnage booked. We revise quotations as follows: Turned, cold rolled and ground shafting in carload lots is quoted 50 off, and in less than carload lots, 45 off; tire steel, 1.80c in carload lots and 1.90c less than carload lots; toe calk, 2.10c to 2.25c; sleigh shoe, 2.10c to 2.25c; machinery steel, 1.70c; smooth machinery steel, 1.75c. Tool steel, 7 cents and upwards.

OLD MATERIAL.—The scarcity of relaying and rerolling rails

continues and prices have advanced sharply during the week. It is reported on reliable authority that a Cincinnati concern has purchased nearly the entire available suppply of old rails and has fully 15,000 tons in stock, holding them for still higher prices. We revise quotations, gross tons, as follows: Heavy wrought scrap, $21 to $21.50; cast scrap, $17.50 to $17.75; iron rails, $25 to $26; car wheels, $19; cast borings, $10.50 to $11; wrought turnings, $13.50 to $14; steel rails, $24 to $28; steel rails for rerolling purposes, $27 to $28.

Coke.—Foundrymen are now commencing to place their orders for coke for delivery not only from July 1 through the remainder of the year, but to July 1 next year. The prices that are being quoted are low, however, the H. C. Frick Coke Co. being in the forefront with moderate quotations on 72-hour coke. We note several large contracts of strictly Connellsville foundry coke at $2.75 per ton, while outside producers are quoting from $2.50 to $2.60 per ton. We also note the closing of one contract for furnace coke which does not expire until Jan. 1, 1904, calling for the delivery of 25 tons per day. The opening of the properties of the United States Steel Corporation in the West Virginia districts means that the Western furnaces of the combine will operate almost altogether on West Virginia coke after January, 1903. For the week ending Saturday, April 12, the production of the Connellsville region amounted to 220,487 tons, a slight falling off over the production of the previous week. The shipments amounted to 11,357 cars, the heaviest week in this region for many months. The railroads are doing all in their power to facilitate the better shipment of coke, and as a result none of the furnaces are suffering and all are beginning to replenish their stock piles. Furnace coke for prompt shipment, strictly Connellsville, is quoted at $2.50 per ton, while outside coke is held at $2.25. Connellsville foundry coke for shipment to July 1 is quoted at $2.85 to $3 per ton and outside coke at $2.60 to $2.85.

CHICAGO.

Office of *The Iron Trade Review*, 534 Monadnock Block, April 22.

Further advances in the price of finished material have been made in the past week. Boiler tubes have gone up 5 per cent; sheets, sizes 10 to 16, have advanced $3 a ton, and plates $2 a ton. No formal announcement of an advance in plates has been made as yet by mills, nor is it probable that any will be made before July 1. The local plate mill is sold up until that date and as it is accepting no new business for delivery after July, the jobbers have promptly advanced prices. Each week this market gets more firmly in the hands of jobbers, owing to the crowded condition of mills on all lines of finished material. In the past week a Louisville firm of architects bought 150 tons of shapes out of stock in this city, and an Eastern railroad came here for channels. In bar iron and steel, local jobbers are able to undersell the mills, having purchased their stock last year when the price was low. Pig iron sales have been few, although there has been a good inquiry. Scrap has weakened to some extent, and prices on a few lines have fallen 25 to 50 cents.

Pig Iron.—Iron for prompt shipment daily becomes scarcer, and sellers wherever they can are buying iron back from customers who have overbought. Sales in the last week have not been numerous, nor have they aggregated a large tonnage, though there have been several large inquiries in the market—one for 5,000 tons, from a local implement manufacturer, for delivery from August to December, and two, aggregating 5,500 tons, for delivery in the first quarter of next year. None of the local sellers would quote on the latter inquiries, however, and in the case of the former the buyer has not yet been able to place his order. Practically all the transactions are limited to carload lots, and it is with difficulty that foundrymen are able to get this much. Malleable foundries are among the most urgent inquirers, and though no buying has been done as yet, it is expected that a movement will set in shortly. We quote as follows:

Lake Sup Charcoal	$21 00 to $22 00	Southern Coke No. 4	$17 15 to $18 15
Local Coke Fdy. No. 1	19 00 to 19 50	Southern No 1 Soft	18 65 to 19 65
Local Coke Fdy. No 2	18 50 to 19 00	Southern No. 2 Soft	18 15 to 19 15
Local Coke Fdy. No. 3	17 50 to 18 00	Southern Gray Forge	16 90 to 17 90
Local Scotch Fdy. No. 1	19 00 to 19 50	Southern Silveries	17 65 to 18 15
Local Scotch Fdy. No. 2	18 50 to 19 00	Jackson Co. Silveries	19 00 to 19 60
Southern Coke No. 1	18 65 to 19 65	Ohio Strong Softeners	18 50 to 19 00
Southern Coke No. 2	18 15 to 19 15	Alabama Car Wheel	20 50 to 21 00
Southern Coke No. 3	17 65 to 18 65	Malleable Bessemer	19 00 to 19 50

Bars.—Mills continue to receive a good volume of business from small consumers, the orders ranging from carload lots to 500 tons. Jobbers report that they are extremely busy, and these in some instances are underselling mills on large orders, being able to do this by the fact that most of them bought their present stocks last year when the price of iron was low, and being able to furnish material promptly. Mills are holding prices firmly at 1.75c to 1.85c for steel, Chicago; 1.95c for iron, Chicago; 2.15c for hoops, Chicago. Prices out of store, steel, 2c to 2.10c; iron, 2.10c to 2.25c; hoops, 2.30c.

Sheets.—There is an excellent demand for both black and galvanized sheets, and Nos. 10 to 16 have advanced $3.00 a ton. We quote No. 27 black, mill shipments, Chicago delivery, 3.15c to 3.20c; galvanized, 4.45c; out of store, No. 27 black, 3.45c to 3.50c; galvanized, 4.70c.

Structural Steel.—Sales in this market are for material from jobbers' stocks. The scarcity of structural shapes in other centers is evidenced by the fact that a Louisville firm of architects had to come to this market for 150 tons of steel for a building to be erected in that city. During the week also an Eastern railroad bought all the 6-inch channels it could get from local jobbers, and managed to buy about three carloads. We quote mill shipments, carload lots, as follows: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; structural angles, 3x3 to 6x6, 1.75c; over 6x6, 1.85c; angles, channels and tees, smaller than 3 inches, 1.85c base; plates, 1.85c; lots from store, tees, 3c minimum; beams and channels, 3c minimum with cartage charges.

Rails and Track Supplies.—There is some inquiry for standard sections and parties who heretofore refused to place their orders owing to late delivery promised by mills are now willing to accept this shipment. There is a good demand for light rails and track supplies, but both local manufacturers are sold up for several months on these materials. We quote standard sections, $28; light rails, 45 pounds, $33; 12 pounds, $40, with regular differentials for intermediate sizes; out of store, $45 to $50; splice bars, 2c; spikes, carload lots, 2.35c; track bolts and hexagon nuts, 3.10c to 3.25c; out of store, 3.50c; square nuts, base, 2.95c; out of store, 3.10c.

Billets.—Some sales of billets are reported in lots of 100 tons and thereabouts, and at prices quoted, viz.: Bessemer billets, $38; open hearth, $40.

Merchant Steel.—One large concern in this city reports that shipments into this field for the month of March exceeded the tonnage for the same month of any year in its history. Buggy manufacturers are beginning to place contracts for steel tire for next season's requirements, this branch of the trade usually following implement manufacturers in its purchases of iron and steel. Prices are held firm. We quote mill shipments, Chicago delivery, as follows: Smooth finished tire steel, 1.95c to 2c; open-hearth spring steel, 2.45c to 2.60c; sleigh shoe, 1.75c to 1.80c, flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.40c to 2.60c; machinery steel, 2.15c to 2.25c, base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.25c to 2.35c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 per cent to 10 per cent higher; cold rolled shafting, carload lots, 50 per cent off, Chicago; less than carload lots, 45 per cent off, Chicago.

Merchant Pipe.—Manufacturers announce an advance of 5 per cent in the price of boiler tubes. Jobbers report an active demand for all sizes of pipe and tubes, and that the outlook is good. We quote as follows:

MERCHANT PIPE, RANDOM LENGTHS.

	Black Per cent.	Galv. Per cent.
⅛ to ⅜ in.	56½	44½
¼ to 12 in.	63½	51½

BOILER TUBES.

	Steel Per cent.	Iron Per cent.
1 to 1½ in.	40	35
1¾ to 2½ in.	47½	37½
2¾ to 5 in.	57½	47½
6 in. and larger	45	40

Cast Iron Pipe.—There is little change to be reported in this material. Daily orders aggregate a good tonnage, and with the approach of warm weather, these are expected to become larger. We quote as follows: 4-inch water pipe, $31, carload lots, f. o. b. Chicago; 6-inch water pipe and larger sizes, $29 to $30; gas pipe, $1 a ton higher than these prices.

PLATES.—The local manufacturer has withdrawn from the market, having sold its capacity until July 1. The company is accepting no new business for delivery after this date, as it is expected an advance will be made at that time. Jobbers have taken advantage of this opportunity to advance prices $2 a ton. We quote as follows, Chicago delivery: Tank steel, base, ¼-inch, 1.85c to 1.95c; flange steel, 1.95c to 2.05c; marine steel, 2.05c to 2.15c; fire box steel, ordinary, 2c to 2.10c; special, 2.25c and upward.

WIRE AND WIRE NAILS.—The demand for all kinds of wire products continues undiminished, and the entire output of the mills of the local interest goes into immediate consumption. We quote as follows: Smooth wire, carload lots, $2.15; painted barb wire, $2.75; galvanized barb wire, in carload lots, $3.05; wire nails, carload lots, $2.20; staples, carload lots, $2.30; jobbers' prices to retailers, 10 cents higher than above for carload lots, and 20 cents for less than carloads.

COKE.—For probably the first time this year the coke shipments into this territory are about equal to the needs. Connellsville coke is selling at $5 to $5.25 for future delivery.

OLD MATERIAL.—The large amount of material which railroads have been shipping into this market, has weakened prices on some lines. This fact, and the additional one that the mills and large consumers have large stocks of scrap in their yards, has aided in slightly reducing the high prices that have been prevailing. It is expected that further reductions will occur within the next few weeks. We quote gross tons as follows:

Old iron rails	$24 00 to $25 00	Old steel rails, mixed	$16 50 to $17 00
Old steel rails, 5 ft. and up	23 00 to 24 00	Relaying rails	27 00 to 28 00
Old steel rails, 3 ft. and under	18 00 to 18 50	Old wheels	19 50 to 20 00
		Heavy melting steel	16 00 to 17 00
		Mixed country steel	13 50 to 14 00

The following are selling prices per net ton:

No. 1 R. R. wrought	$19 50 to $20 00	Steel axles	$19 00 to $19 50
No. 2 R. R. wrought	18 00 to 18 50	Cast borings	8 50 to 9 00
Dealers' forge	15 50 to 16 00	Wrought turnings	12 50 to 13 00
No. 1 busheling	13 50 to 14 00	Iron axle turnings	14 00 to 14 50
No. 1 R. R. & mch. cast	13 50 to 14 00	Steel axle turnings	13 00 to 13 50
Railway Malleable	15 00 to 15 50	Stove plates	10 50 to 11 00
Country malleable	13 00 to 14 00	Old iron splice bars	21 00 to 21 50
Iron axles	24 50 to 25 00		

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, April 23.

Notwithstanding the exceptionally early opening the amount of new ore put on Lake Erie docks in April will not be what might be expected. Boats have been delayed at upper lake ports, partly owing to the tardy return to ore roads of cars that have been in other traffic during the winter, and in part because of frozen ore. The steel corporation fleet has been held up in this way, as well as chartered vessels. We referred last week to the unexpectedly large stocks of ore on Lake Erie docks, the result of the furnace stoppages of the past four or five months. These dock stocks account in part for the divergent views of ore shippers and vesselmen on the vessel rate for the present season. Basing their calculation on the abounding prosperity of the iron trade and the general belief that consumption of ore will be considerably greater in the next twelve months than in the year ending May 1, a number of vessel owners have refused to tie up at the 75-cent rate and are taking their chances on the daily rate. Shippers, on the other hand, show no anxiety to cover further at present and rely on the heavy dock of ore stocks and the large increase in vessel tonnage this season to demonstrate the correctness of their position. The ore market is without incident. Small lot buying still goes on, and the important sales of Bessemer iron with deliveries extending over to April 1, 1903, are likely to bring more ore buying from furnaces that did not cover fully in the early transactions. There are some Mesabi properties that have a considerably greater producing capacity than is represented by their sales thus far.

PIG IRON.—The difficulty the average foundry experiences in getting iron enough to keep going is still the most obtrusive factor in the situation. There are instances in which furnaces are three and four months behind on deliveries, the buyer meantime having to turn elsewhere for supplies. Inquiries of this sort are taking up all the spot iron and more could be sold at top prices if it could be had. Foundrymen trying to make sure of their supply for the balance of the year are going from one seller to another. Some that expect to have iron to offer later in the year are not booking business now, preferring to await the developments of the next few months. Whether, in the effort of some buyers to make themselves safe, the total of their orders placed with various furnace firms will not exceed their actual requirements, will appear later; but present indications are that furnaces will be able to dispose of any iron on which delivery is held up, for there is the contingent of smaller buyers whose wants are not now provided for but which will aggregate a good tonnage before the end of the year. We note no change in prices in the week. Southern No. 2 foundry is selling at $15 and $15.50 Birmingham for delivery in the second half. Stocks in the Southern States are now so low—about 15,000 tons—that spot iron is a very small factor. Bessemer iron is quoted $18.50 to $19 at furnace for shipment in the second quarter; Northern No. 2 foundry at $18 to $19, according to amount and time of delivery; gray forge at $17.50 to $18. For quick delivery forge has brought an advance over the latter figure. There is a marked scarcity and mills that require a certain amount of Southern forge for their muck bar are just now unable to supply their needs. We quote the Cleveland market:

Bessemer	$19 75 to $20 75	Scotch No 1	$19 75 to $20 75
No. 1 Strong F'dry	19 25 to 20 25	Scotch No. 2	19 25 to 20 25
No. 2 Strong F'dry	18 25 to 19 25	Gray forge, Valley	18 00 to 18 50
No. 3 Foundry	17 75 to 18 25	LakeSuperior charc'l	22 00 to 23 00

FINISHED MATERIAL.—Sheets from No. 10 to No. 16 inclusive have advanced $3 a ton. Plates are $2 a ton higher—though not by any official action of the mills in the agreement—for anything like early delivery; iron boiler tubes have advanced about 5 per cent. This in brief covers the price changes of the week, apart from an advance from 1.90c Cleveland to 2c Cleveland for bar iron out of store. Steel bars from stock are 1.90c Cleveland. Specifications are coming in steadily on bars, without any great amount of new business. We quote mill shipments at 1.70c Cleveland for steel and 1.80c to 1.85c Cleveland on iron. Plates are steadily growing firmer and prices are advancing for near-by deliveries without any action by the pool. The recent advances by Eastern mills will hold, and the question is up whether an advance of the agreed price will not become effective before the quarter is out. A better demand for light sheets is looked for with the active beginning of outdoor work, sales thus far not having been large. The heavier gauges have been well taken up. The following prices are quoted on mill sales: No. 24, 2.90c to 3c; No. 26, 3c to 3.10c; No. 27, 3.10c to 3.20c; and the following prices out of stock: No. 10, 2.36c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.55c to 2.70c; No. 16, 2.95c to 3.10c; No. 18, 3c to 3.15c; No. 20, 3.05c to 3.20c; Nos. 22-24, 3.15c to 3.30c; Nos. 22-26, 3.25c to 3.40c; No. 27, 3.35c to 3.50c; No. 28, 3.45c to 3.60c, for one pass cold rolled. For full cold rolled .10c extra is charged. On galvanized sheets Cleveland prices to consumers are as follows for carload lots: Nos. 10 and 11, 3.15c; Nos. 12 to 14, 3.25c; Nos. 18 to 21, 3.55c; Nos. 22 to 24, 3.85c; No. 27, 4.35c; No. 28, 4.60c.

Old iron rails	$ 23 00 to 24 00
Old steel rails (6 ft. and over)	20 00 to 22 00
Old steel rails (6 ft. and under)	17 00 to 18 00
Old car wheels	16 00 to 18 00
No. 1 R. R. wrought scrap	21 00 to 22 00
Mill scrap	17 00 to 17 00
No. 1 machine cast scrap	15 00 to 16 00
Iron axles	26 00 to 28 00
Axle turnings	16 00 to 17 00
Wrought turnings (free from cast)	13 50 to 14 00
Cast borings	8 00 to 9 00
Uncut wrought iron boilers	11 00 to 12 00
Steel boiler plates	16 00 to 17 00
Grate bars	11 00 to 12 00
Pipes and flues (clean)	17 00 to 18 00
Tank iron	17 00 to 18 00
Hoop and band iron	13 00 to 14 00
Sheet iron	11 00 to 12 00
Wrought drillings	13 00 to 13 50
Malleable iron	17 00 to 18 00
Stove plate	12 50 to 13 50
Heavy steel	17 00 to 18 00

CINCINNATI.

April 23.

With but a little iron on the market and with the greater number of consumers practically covered until the last quarter of the year, the iron trade has been rather quiet. The large Southern producers maintain their position of keeping out of the market, but they have taken another stand in regard to the prices at which they may sell when they do offer again. It is now expected that they will sell iron at higher prices than $12 Birmingham for No. 2 when selling is resumed.

The market for finished material is in such a condition that

producers are put to it to make deliveries that will in any way satisfy the consumers. The demand has been so great that they are getting farther behind instead of being able to catch up. All manufacturing lines are doing exceptionally well and there is a demand for all iron products whether building material, material for use in machine shops or finished machinery.

PIG IRON.—The tonnage of new business during the past week has not been great but there has been enough doing to make a basis on which to quote pig iron at about the price noted last week. Southern furnaces are not in a position to sell very largely, most of them having sold their product until well toward the close of the year. One order placed here this week for 2,100 tons of foundry iron was filled by five different furnaces. This shows how business is made up of small lots gathered here and there. Prices on the iron sold have been strong and have been more generally at $15.50 and $16 for No. 2 Birmingham than at $15. A considerable order for No. 2 Southern foundry was placed this week at $19.65 Chicago, equivalent to $18.75 Cincinnati or $16 Birmingham. There is some talk about importation of English foundry iron, but so far the iron that has been brought in is but a drop in the bucket. Prices at Cincinnati are quoted as follows:

Southern Fdy. No. 1		$17 75 to 18 50	Gray Forge		$16 25 to 16 75
"	"	2 17 25 to 18 00	Northern Fdy. No. 1		21 00 to 21 25
"	"	3 16 75 to 17 50	"	2	20 50 to 20 75
"	"	4 16 25 to 17 00	Southern C. W. iron		21 75 to 22 75
So. Fdy. No. 1 soft		18 25 to 19 00	Malleable coke iron		20 60 to 21 10
So. Fdy. No. 2 soft		17 25 to 18 00			

FINISHED MATERIAL.—Manufacturers of all kinds of finished material report that there is no let up in the demand and that the consumers are calling loudly for delivery of stuff purchased some time back. The structural material people are especially in hot water, being unable to make anything like satisfactory deliveries and being subjected to all sorts of criticisms from handlers of this product and from builders who not only complain to the middleman but write directly to the producers and lay their troubles before them. Iron and steel bars are in good demand and prices are very stiff; bar iron being quoted at 1.92c and bar steel at 1.72c, as has been maintained for the past two or three weeks. Iron stores are still selling at 2.20c. Other materials remain unchanged.

OLD MATERIAL.—Scrap is still hard to get at current quotations, not only on account of the fact that the market is pretty well cleaned up but also because the railroads are practically offering no scrap. Quotations are about as follows:

Old No 1. Wrought Railroad, net tons	$ 19 00 to 19 25
Cast Machine and Foundry, net tons	13 75 to 14 00
Old Iron Rails, gross tons	24 00 to 24 25
Old Steel Rails, gross tons	24 00 to 24 25
Old Short Lengths, gross tons	17 00 to 17 25
Old Iron Axles, gross tons	23 75 to 24 00
Old Iron Car Wheels, gross tons	18 50 to 19 50
Stove Plates, gross tons	10 50 to 10 75
Wrought Turnings, net tons	13 00 to 14 00
Cast Borings, net tons	7 50 to 8 50

PHILADELPHIA.

April 22.

A quieter feeling has shown itself during the week which would indicate that buyers are recognizing the futility of attempting to force their orders upon unwilling sellers and are disposed to await more favorable conditions. There is no let up in consumption and it now appears that unless the output of iron goes a long way beyond the highest record serious trouble will ensue.

Much has been said about relief from abroad, but the facts do not hold out much hope that this will be secured. A brisk demand upon European producers would quickly advance values to a point where exports would be out of the question. While no one can predict what will take place even in the immediate future it is the general belief that we may expect the present heavy demand to continue and that prices will remain firm should they not show further advances. Nearly every branch of industry has more work than it can take care of and the amount of business under way is greater than was ever known. Under such conditions it can not be expected that anyone should hold unfavorable views of the general situation.

PIG IRON.—Prices are working toward a higher basis and the differences which have existed between short and long term deliveries is slowly disappearing. It now looks as if production at the middle of the year will not be as close to consumption as was predicted some time ago. Stocks still show a falling off although it is expected that furnaces from this time forward will give better results in increased output. All kinds of prices are being asked for iron, though much depends upon its quality and time of delivery. We quote the following prices for the last half of the year, deliveries to be made in city or vicinity; shipments covering May and June command from 75c to $1.50 above these figures: No. 1 X foundry, $19.50 to $20.50; No. 2 X foundry, $18.75 to $19.50; No. 2 plain, $18.50 to $19.00; standard gray forge, $17.50 to $18; ordinary gray forge, $16.75 to $17.25; Basic (chilled), $18 to $18.50.

FINISHED MATERIAL.—Demand is fully maintained in all lines and deliveries difficult to obtain short of three or four months' time. What little structural material is being imported does not cut much of a figure as it is not even sufficient to supply very urgent needs. Scarcity is also manifesting itself in plates and bars. Prices depend altogether upon time of delivery and call for a premium of from five to fifteen dollars above standard quotations, which follow: Plates, ¼-inch and thicker, 1.85c to 1.95c; bars, steel, 1.80c to 1.85c; iron, 1.95c; angles, 1.75c to 1.85c; beams and channels, 1.75c to 1.85c.

OLD MATERIAL.—Higher prices are being quoted, especially where early delivery is specified. Bids and offers are about as follows for deliveries buyers' yards: Choice railroad scrap, $25.50 to $26; ordinary light scrap, $16 to $17; machinery cast, $18.25 to $18.75; heavy steel scrap, $21 to $22; old iron rails, $25 to $26; wrought turnings, $16.75 to $17.50; cast borings, $10 to $10.50; old iron axles, $26.50 to $28; old steel axles, $24 to $25; old car wheels, $18 to $19.

American Foundrymen's Association at Boston.

Secretary Richard Moldenke, in a recent circular, announces that the Hotel Brunswick has been selected for the headquarters of the American Foundrymen's Association convention Tuesday, Wednesday and Thursday, June 17-19. The meetings will be held in the large assembly hall of the Massachusetts Institute of Technology which is close to the selected headquarters. The secretary calls attention to the need of papers for the coming meeting and suggests that foundry managers prepare short talks on topics of general interest and calculated to promote discussion among those present. This is a feature that may be made of great value. The topical questions taken up at some of the meetings of the American Society of Mechanical Engineers are often among the most interesting features of the sessions.

The secretary states that from reports thus far received the attendance promises to be even greater than that at Buffalo last year. The arrangements under way by the Boston foundrymen indicate an unusual program of entertainment.

Steel Plant at South Chicago.

A Chicago dispatch announces that plans have been made by the South Chicago Furnace Co. for the erection of a $2,000,000 steel plant on the company's property on the Calumet river at South Chicago. A blast furnace is now operated by this company and plans have been made for an additional furnace, as recently announced. Concerning the steel works project it may be said that the telegraphed statement is premature and that the publication of a list of stockholders of the South Chicago Furnace Co. as the persons identified with the proposed enterprise is not correct.

The steamer A. R. Thorp arrived at Baltimore, Md., last week on Friday with 1,000 tons of steel billets from Sydney, Cape Breton. This is the first shipment of a considerable tonnage of Dominion Iron & Steel Co. billets to be landed at Baltimore, Philadelphia and New York, and it will constitute 30 or 40 shiploads.

The Ruthven Machinery Co., of Chicago, has been incorporated with a capital stock of $2,500 to manufacture tools and machinery. The incorporators are: William Ruthven and John C. Pirie.

Edward Abbott is making arrangements to locate a machine shop at Atlantic, Ia.

THE IRON TRADE REVIEW

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APRIL 24, 1902.

ANTI-INJUNCTION LEGISLATION.

The injunction as an accompaniment of strikes has had special attention both from labor unions and employers' associations in recent weeks. At the convention of the National Association of Manufacturers at Indianapolis the president's address referred particularly to the anti-injunction bill now pending in Congress as a measure to which manufacturers need to give serious attention. It was also referred to at the recent convention of the National Metal Trades Association at Cincinnati and the members of this assocation in their individual capacity have sent their protests to Washington in the past few months. The object of the bill, which was originally regarded with favor by the Senate Judiciary committee but afterward amended in response to the protests of hundreds of manufacturers, was to take conspiracy in connection with labor strikes out of the conspiracy category. It provided that combinations or agreements entered into in furtherance of any dispute between employer and employee should not be deemed criminal, and that those entering into them should not be punishable for the crime of conspiracy unless the act when committed by one person is punishable as a crime.

In other words a conspiracy to injure the business of a company with whom a labor union is at war is no conspiracy, and the laws for the protection of property and business are to be suspended where the leaders of a strike consider it necessary for the carrying of their point to inflict such injury as shall lead the other party to the conflict to come to terms.

The movement by trade unions for the enactment of the proposed law is of a piece with the opposition of trades unions to the enlistment of their members in the militia, because the citizen soldiers are often called upon to quell riots growing out of strikes. Their attitude in both cases is nothing less than a confession that the strike program includes either physical coercion or the infliction of serious financial injury. Militia do not disturb law-abiding citizens; neither have injunctions ever been issued in labor disputes except against those who have already committed violence, or who are known to be planning coercion of workers or injury to the property or business of the firm against which they are waging war. The whole movement is designed to put on the statute books more of that vicious "labor legislation" which is the sop thrown to organized labor by a type of legislator only too well known for his capacity to do harm.

The Ohio Legislature—and doubtless legislatures in other States—has a bill pending which provides that no "final order or permanent injunction in any cause shall be granted by any court of original or appellate jurisdiction without first submitting the facts to a jury upon the request or application of either party to said cause of action." The purpose plainly is to deprive employers, in cases of strike, of any opportunity to prevent violence and destruction of property. The very essence of the injunction is the prevention of a criminal act. For this effective and time honored recourse, in cases which demand immediate action, the purpose of the new law is to substitute an after-the-fact procedure before a jury. While a jury might very properly pass on a question of damages after injury had been done, it is notoriously not a vehicle of preventive relief, and the only effect of such a law as that proposed would be to let the passion engendered by labor troubles run its full course and at length bring the reckoning before a jury to decide a question that by that time would have ceased to be an issue.

The executive council of the American Federation of Labor was right for the most part in declaring at its recent meeting: "The American workmen are law abiding, faithful and loyal citizens. They have no desire for immunity from the laws governing other citizens, but they most emphatically resent and protest against the actions of courts convicting them and sentencing them to prison for acts which they have the legal right to perform; and condemned, too, without proper opportunity for defense and trial before a jury of their peers."

Our observation is that the whole tendency in the administration of criminal laws in the United States is toward lenience to the accused. Not an instance can be cited in which men have been imprisoned for activity in strikes, except there has been violence or the threat of violence, or actual or threatened destruction of property. The idea that because a strike involves a state of war therefore war measures may legally be adopted by organized labor to carry its point, is at the root of all the indignant protests against the "usurpation" of courts and the enforcement of laws against conspiracy and violence by strikers. The trouble is that organized labor does not tolerate the idea that any strike should fail, or that any means employed to win can be anything but justifiable.

A LOOK AHEAD IN STEEL PRODUCTION.

Statisticians now and then venture a prophecy concerning the iron and steel production of the United States in the more remote future; manufacturers less often. Recently some little comment has been excited in certain circles by the prediction informally made by a leading steel manufacturer, that the steel production of the United States 10 years hence will be 30,000,000 tons. The statement is surprising and the first thought

will be that its realization is quite improbable. We presume the chief basis for it is the fact that our pig iron production has practically doubled in certain periods of 10 to 12 years, and the further fact that steel production in recent years has leaped forward by larger percentages than has that of pig iron. Doubt will be cast upon it by the marked reaction in the early years of the past decade, and by the general expectation that the present enormous steel consumption will fall off, possibly next year or the following year—at all events will not last.

This latter view will be commonly held, the general judgment being that a year of bad crops coming after six bountiful years, or speculation, or over development in particular lines, or excessive production of industrial securities, with their large absorption of available capital—all or any one might lessen materially the demand for steel. All are possible, and the argument from averages would put the interruption to our prosperity not far ahead.

But leaving out opinions, pertinent as they may be, seeing that the question is so largely one of estimates, there is much of interest in a comparison of figures representing actual outputs. In the table below are given the production of Bessemer and open-hearth ingots in the United States in 1880, 1890, and in all the years following:

INTRODUCTION OF STEEL IN THE UNITED STATES—GROSS TONS.

	Bessemer Ingots.	Open-Hearth Ingots.	Total.
1880	1,074,262	100,851	1,175,113
1890	3,688,871	513,232	4,202,103
1891	3,247,417	579,753	3,827,170
1892	4,168,435	669,889	4,838,324
1893	3,215,686	737,890	3,953,576
1894	3,571,313	784,936	4,356,249
1895	4,909,128	1,137,182	6,046,310
1896	3,919,906	1,298,700	5,218,606
1897	5,475,315	1,608,671	7,083,986
1898	6,609,017	2,230,292	8,839,309
1899	7,586,354	2,947,316	10,533,664
1900	6,684,770	3,398,135	10,082,805
1901	8,713,302	4,656,309	13,369,611
1902 (estimated)			15,000,000

The steady increase in open-hearth steel production since 1890, in good times and bad, is one noteworthy feature of the above exhibit. Another is the fluctuations in the production of Bessemer steel. The significant fact about these is that wherever there was a falling off in any year from the preceding one, the year following in every instance but one—1894—carried production to a new high water mark.

In the light of the history written in the table the prediction that 30,000,000 tons of Bessemer and open-hearth steel ingots will be produced in this country in 1912 is not so extravagant as it appears at first blush. It is not unreasonable to expect that the marvelous record of 13,369,611 tons of steel last year will be increased to 15,000,000 tons in 1902. The question then is, if our steel production in 1902 more than trebles the 4,838,324 tons of 1892 can the record of 1902 be doubled in the ten years following?

What 30,000,000 tons of steel in 1912 would mean in blast furnace and steel works construction in the next ten years, and in engine building and in every line that prospers when the iron trade is expanding, is a matter of pleasant contemplation for all connected with these allied industries.

United Engineering & Foundry Co. Purchase.

(Special Telegram.)

PITTSBURG, Pa., April 23.—A deal for the purchase of the chilled roll foundry of the Apollo Iron & Steel Co., Vandergrift, Pa., has been about closed by the United Engineering & Foundry Co., of this city. The purchase of this plant gives the latter concern four operating foundries and the largest output of rolls of any concern in the world. The foundry at Vandergrift has operated almost exclusively on chilled rolls since its construction several years ago and is modern in every particular. The purchase price is reported to be about $325,000. The officers of the foundry department of the Apollo Iron & Steel Co. are as follows: George G. McMurtry, president; F. H. Vandergrift, vice president; M. B. Bache, treasurer, and J. R. Buchanan, secretary. The United Engineering & Foundry Co. is also said to be negotiating for the purchase of another foundry producing rolls and rolling mill machinery.

THE HARDWARE JOBBERS' CONSOLIDATION.

John Bindley, president of the Bindley Hardware Co., of Pittsburg, who is to be vice president and chairman of the finance committee of the $120,000,000 consolidation of hardware jobbers, makes the following statements in an interview:

"There is not a word of truth in the report that the new company is to engage in manufacturing. When we started out we had some 40 hardware interests that were willing to join the scheme. The project appealed so favorably to the retail hardware interests that now we have the promise, by the time we get organized, that at least 60 of the largest hardware houses in the country will be willing to join our united interests with theirs.

"The purpose of the consolidation of interests is to effect economies in various business ways. No thought has been had of manufacturing the goods to be handled by the many allied concerns. In fact, we should be breaking faith with the manufacturers should we engage in any such venture. By buying in big lots for all the houses we naturally could get better terms from manufacturers. The latter are aware of this object. Hence, if we were to attempt to make our own goods we would be breaking faith with the manufacturers, which is something we do not propose to do; neither could we afford to do it.

"I am afraid the purpose of this organization of the large hardware dealers is misunderstood. We are not trying to increase prices. On the contrary, we are trying to lower prices of hardware to the retail dealer and to the consumer. Just let me give you one instance, which refers to the expensive issue every year of large catalogues. Every large hardware firm gets out these books every year. In the future one catalogue will suffice for all the firms in the combine. This in itself will be a saving of a hundred or more thousand dollars a year. Economies of similar kinds will be effected in the same way. In short, the consolidation of hardware interests expects to make its money, not by an increase in prices, which would be impracticable, but by the practice of economic measures.

"I am not aware that this consolidation of interests will throw anybody out of employment. Men now employed by the proposed allied concerns will be given work somewhere around those establishments. For instance, I do not expect that a single employe of the Bindley Hardware Co. will be dismissed because of the alliance of the company with the new combine. In other hardware houses the same rule will prevail. A little readjustment may result here and there, but that is all.

"There is another thing I wish to mention in this connection. The new combination will be the largest consolidation of mercantile interests ever attempted in the world. One of its purposes and hopes will be to increase the exportation of hardware to foreign countries, and in this I have no doubt that it will be very successful."

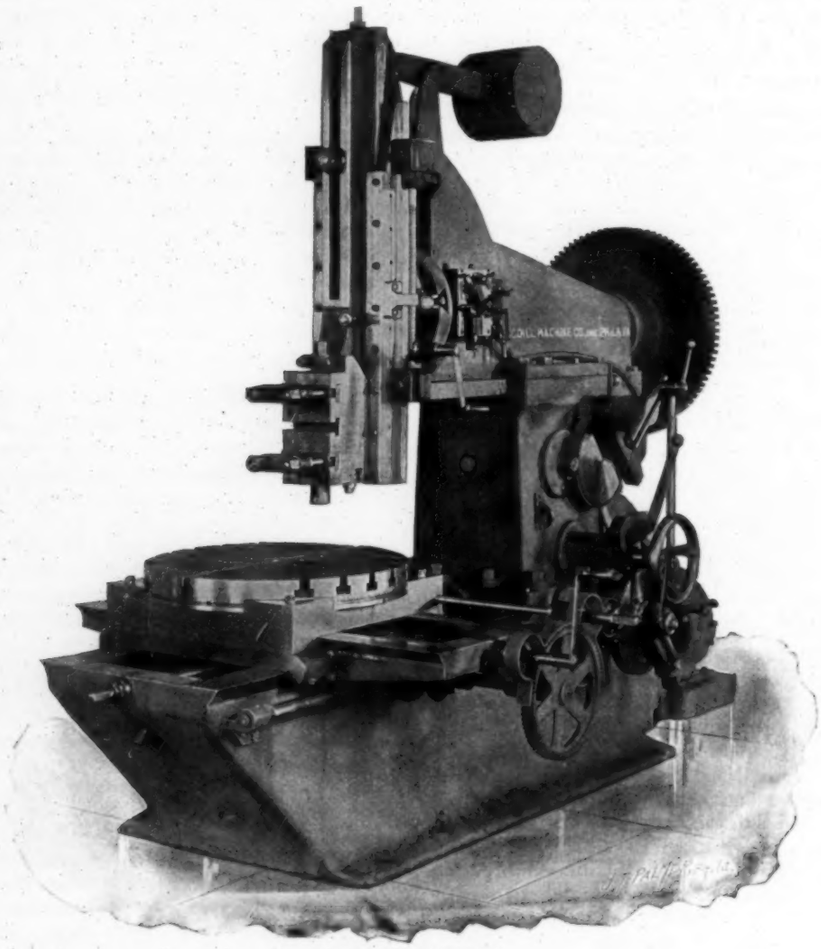
Strength of the Blast Furnace Workers' Union.

(Special Telegram.)

PITTSBURG, April 23.—An investigation made on behalf of the blast furnace companies in the Mahoning and Shenango Valleys to ascertain the approximate strength of the Blast Furnace Workers' Association, shows a fairly strong organization among the furnaces in the Mahoning Valley, though the furnaces of the Ohio plant of the National Steel Co. are not organized. In the Shenango Valley, Sharpsville is the most thoroughly organized, while in Sharon, South Sharon and New Castle, there is little indication that the men will go out. An organization was recently perfected at the New Castle stack of the Republic Iron & Steel Co., but last week the furnace was blown out for repairs. Outside of the Valleys the association has no strength whatever.

A NEW 15-INCH SLOTTER.

The illustration shows a new 15-inch slotter, designed and manufactured by the T. C. Dill Machine Co., of Philadelphia. The half-tone presents a front quarter view of the machine with the head extended out of the housing toward the table. The machine being motor driven in this instance, but the firm builds a belt driven type as well. The traveling head is an important feature in the design, as it enables a small machine to do much of the work of a larger one as well as some work that could not be accomplished on a larger machine of the stationary type; the class of work in fact which is too cumbersome to be fed along the cut after it is set. In such cases with the machine under consideration the traveling head is fed along, shaper fashion, and does the work. It will readily be understood in this connection that with the table all the way out and the head set back in the housing or column, the exterior of extremely large circles may be machined.



NEW 15-INCH SLOTTER.

A quick traverse gear is provided for moving the head and compound table in all directions quickly by power, a labor and time saving provision of great importance. An automatic knock-off for the quick traverse gear is so arranged that should the head or table meet with an obstruction or undue resistance it will throw itself out of gear without injury to any part. The intermittent feed is accomplished without the use of cams, giving a quick feed with a slow initial and terminal movement. This feed operates on the head as well as on the table in all directions. The quick return is very satisfactory, as it accomplishes its object without wasting time at each end of the stroke.

It has six changes of speed with a constant speed countershaft or motor. The speed of the countershaft is 130 revolutions; of motor, 950 revolutions. Length of stroke, 15½ inches; longitudinal movement of table, 36 inches; transverse movement of table, 30 inches; diameter of table, 34 inches; movement of head, 22 inches; distance from table to ram guide when in highest position, 17 inches; distance from table to ram when in highest position and in center of stroke, 26 inches. The lowest point of ram when in center of stroke, flush with table. The machine will cut to the center of a 72-inch circle and will cut to the outside of a 90-inch circle. Net weight, 10,000 pounds.

Lake Superior Iron Mines.

It is reported that the steel corporation proposes to introduce a combination steel and wood shaft in its Lake Superior mines, using plates to cover the surface of the wooden walls. The experiment will probably be tried at one of the Ely, Minn., mines.

A strike is on at the Florence iron mine at Florence, Wis., the men going out because of the refusal of the management to reinstate six discharged miners. The owners of the property, Ladenberg, Thalman & Co., of New York, will remodel the surface plant meantime and two 80-h. p. boilers will be added. Improvements to the shaft will be made also. When the strike came the manager was planning with his mining captain how the men could be kept employed while the changes were in progress.

What have been known as the Carnegie docks at Erie, Pa., have been leased to M. A. Hanna & Co. The steel corporation allowed the Erie lease to expire without renewal and will concentrate operations at the Conneaut docks. It is expected that the additional handling facilities at the latter port will give a record of 4,000,000 tons of ore this season.

The Cleveland-Cliffs Iron Co. has been acquiring considerable timber land recently in the Upper Peninsula of Michigan. A deal has just been closed for a tract of 30,000 tons in Alger and Luce counties.

The Pickands Iron Co., of Marquette, capital $30,000, has been incorporated in Michigan. Among the incorporators are H. G. Dalton and H. S. Pickands, of Cleveland, and J. R. Van Evera, of Marquette.

Report of the Department of Labor on Strikes.

The history of the mutual relationship of employer and employed is always a deeply interesting study, ofttimes a story of warfare rather than of peaceful progress, a condition where concessions on either side are seldom regarded as evidence of magnanimity but of justifiable fear. Perhaps we are nearer now than ever to the stage where labor questions may be considered on that broad plane where an injury to either party may be held as an infliction of common suffering and deserving of equal attention from the one and the other. This condition is not yet so freely accepted that all are prepared to surrender the implements of active antagonism and it may be admitted that there are some grounds for the preservation of an armed neutrality. The preparedness for war may be the most potent guarantee of peace.

At a time when we have the spectacle of leaders of labor organizations, captains of industry and eminent citizens from the purely professional walks of life, fraternizing in the hope that by the communion of ideas the civic atmosphere may be cleared of the clouds of dissention, it is worth while to make some examination of the labor question. The student need not go extensively into the literature of the past so far as strikes and lockouts are concerned, or the decisions of courts and the legislation of the various states concerning conspiracies, boycotts and other features of labor controversies. This task has been to a considerable extent performed for him in a recent publication of the Department of Labor. The Sixteenth Annual Report is furnished with the long and doubtless carefully prepared tabular matter with which such publications are usually charged, and some of these data are capable of holding the general attention; but as a rule such statistics must require an amount of time for due preparation out of all proportion to the ultimate impression upon the reader.

It does not seem practicable to carry out anything more than a superficial examination of the actual conditions incidental to a strike or lockout and any dependence upon the files of newspapers, for example, in the preparation of a report on these matters covering the United States seems obviously liable to many inaccuracies. The latter portion of the book, treating upon strikes and lockouts occurring prior to 1881, decisions relating to strikes, boycotts, etc., and the laws relative to these, is of decided interest and value. The history of strikes and lockouts must of necessity have many important breaks in the chain of events and any theory is necessarily of but comparative value when based upon this incomplete material. It is, however, of no small degree of importance to learn something of these earlier industrial disturbances and the later investigator may be able to ascertain definitely whether these strikes and lockouts had their genesis under conditions which have passed away and whether the more recent disturbances are the result of the comparatively modern powerful organizations of workmen, the outgrowth of discontent with existing industrial conditions or the natural result of development along purely educational lines.

A Twenty Years' Strike Record.

During the twenty years from January, 1881, to the end of December, 1900, the tabular statement shows that New York had the largest number of strikes, as well as the largest number of establishments affected, the number of strikes being 6,460, representing 28 per cent of the total strikes during the period, and the number of establishments affected being 37,845, representing 32 per cent of the total number involved during that period. Pennsylvania follows with 2,846 strikes, or 12 per cent of the total strikes, and Illinois with 2,640 or 11 per cent. As regards establishments affected by strikes, Illinois follows New York with 20,784, or 17 per cent, while Pennsylvania comes next with 18,438, or 15 per cent. The largest number of employes thrown out of employment by reason of strikes is found in Pennsylvania, which shows 1,666,043 for the twenty-year period, or 27 per cent. New York follows with 1,193,361, or 19 per cent; Illinois with 850,599, or 13 per cent; Ohio with 415,651, or 6 per cent, and Massachusetts with 348,470, or 5 per cent. The lockouts during the same period were distributed as follows: 21 per cent were in New York, 11 per cent in Pennsylvania, 9 per cent in Massachusetts, 9 per cent in Illinois, 7.9 per cent in Ohio. Considering the establishments involved, however, the order is as follows: Illinois with 35 per cent, New York with 34 per cent, Pennsylvania with 6.8 per cent, Massachusetts with 5 per cent, Ohio with 2 per cent. As regards the number of people thrown out of employment by reason of lockouts, New York leads with 149,651, or 29 per cent, and is followed by Illinois with 132,906, or 26 per cent, Pennsylvania with 57,743, or 11 per cent, Massachusetts with 35,981, or 7 per cent, Connecticut with 22,560, or 4.4 per cent, and Ohio with 20,866, or 4 per cent.

Strikes of the Early Thirties.

It is pointed out that while it may truly be said that the strike as a method employed by workmen to obtain the redress of real or fancied grievances did not assume such importance as to call for an investigation by the Government of the United States until the year 1880, yet it is equally true that the strike was not a new weapon in the hand of the laborer, for isolated cases of strikes had existed before the beginning of the present century. Though it is the very generally accepted opinion that the disturbance in New York, in 1803, popularly known as the "Sailors' Strike," was the earliest example of the strike known in this country, testimony is brought forth in the present report of the Department of Labor to show that a series of strikes occurred among the boot and shoe makers of Philadelphia, beginning in 1796, and also make it reasonably certain that a strike occurred among the bakers in the city of New York as early as 1741. From these earlier instances, the practice of striking by employes who desired some concession regarding their wages, or were otherwise dissatisfied with the conditions under which they worked, grew until in 1835 strikes had become so numerous as to call forth remonstrant comments from the public press. The New York *Advertiser* on June 6 observed that "strikes are all the fashion," and that "it is an excellent time for the journeymen to come from the country to this city." From this period to the present time strikes have been a common occurrence, their frequency depending upon the industrial conditions prevailing. It appears that many of the strikes occurring in the first half of the last century were directed to the institution of a shorter working day. In 1831, for example, about 60 machinists in Taunton, Mass., struck to obtain permission to quit work at sundown, the employers having required the workmen to remain until 7.30 p. m. Numerous other strikes for a like purpose, the general introduction of a ten-hour day being the main question at issue, were commenced about the same period and in a number of cases trials for conspiracy were involved, a procedure of frequent use in these early days. In 1836 a strike of tailors took place in New York for an increase of wages. By "threats, promises and various modes," they kept others from working except at union prices. Several hundred of them paraded the streets with music and banners bearing in some instances profane mottoes. Twenty-one of the strikers were tried and sentenced to pay fines ranging from $100 to $150. A curious instance occurred in a demand made in 1839 by some of the employes of the railroad sections between Reading and Hamburg, Pa., a request being made for more whiskey, the allowance being 1½ pints per day to each man, dealt out in nine doses.

Strikes by Unions Have Better Chance of Success.

Of the 1,491 strikes and lockouts recorded as taking place prior to 1881, the result of 438 is unknown, 583 were failures, 154 were compromised and 316 were successful. There is another feature in this connection, regarding the value of organization when applying to the period commencing with Jan. 1, 1881, and terminating Dec. 31, 1900. It is submitted in the present report that of the 103,455 establishments in which strikes were recorded as ordered by organizations during the twenty-year period, the strikers gained their demands in 54,690, or 52.8 per cent of the establishments; they succeeded in partly gaining them in 14,066, or 13.6 per cent, while they entirely failed in only 34,699, or 33.5 per cent of the establishments. On the other hand, it is seen that in the 13,913 establishments in which strikes were reported as not having been ordered by organizations, the strikers succeeded in gaining their demands in but 4,947, or 35.6 per cent; they partly succeeded in 1,259, or 9 per cent, while in 7,707, or 55 per cent of the establishments they entirely failed in gaining any part of their demands. This is of course a consideration of the

matter in the aggregate, but an examination of the figures for each of the 20 years of the period shows without exception similar conditions as to the success and failure of strikes ordered and not ordered by organizations. While the percentages vary in the different years, the tables show that strikes ordered by and carried through under the auspices of labor organizations were more generally successful than those not so ordered and assisted. The per cent of establishments in which strikes ordered by organizations succeeded varied from 33.4 per cent in 1886 to 76.3 per cent in 1889, while the per cent in which strikes not so ordered succeeded varied from 25 per cent in 1888 to 49.9 per cent in 1889.

Legislation on Arbitration.

The statutes of the several states designed to directly affect and regulate strikes and lockouts and the conditions growing out of them are quoted at some length, and in addition there is a general statement concerning arbitration and its legislation. The majority of the statutes in regard to arbitration provide for the formation of a permanent board before which by common consent disputes and controversies between employer and employes may be arbitrated. The states whose statutes so provide are as follows: California, Colorado, Connecticut, Idaho, Illinois, Indiana, Louisiana, Massachusetts, Michigan, Minnesota, New Jersey, New York, Ohio, Utah and Wisconsin. In addition to the provision for a state board, contained in the statutes of the above named states, provision is made for the formation of local boards in the case of the following states: Colorado, Idaho, Minnesota, Montana, New Jersey, New York, Ohio and Wisconsin. The statutes of Iowa, Maryland, Missouri, Pennsylvania and Texas do not provide for a permanent board of any kind, but for the appointment of temporary "boards" or "tribunals of arbitration" and "courts of conciliation" when ever the occasion for such an institution arises. One of the Pennsylvania statutes is peculiar in that it provides for the formation of a board of arbitration upon the application not only of both the parties to the controversy, but also upon the application of one of them alone. The statute of Missouri provides that the commissioner of labor, upon being reliably informed that a strike or lockout is about to take place, shall visit the locality of the dispute and seek to mediate, and, upon the failure of his effort in this direction, shall appoint a board of arbitration who shall have power to summon and examine witnesses, etc., and to render a decision upon the matter in dispute. This decision, however, has no binding power upon the parties but its "only effect" is, under the law, "to give the facts leading to such dispute to the public through an unbiased channel." The state of Colorado also has an act providing for an attempt at mediation to be made by the Commissioner of Labor, though no person is made for the appointment of a board by him, and its act providing for a state board stipulates that the said board shall always attempt to mediate when it obtains knowledge of a threatened strike or lockout. In this latter provision the statutes of Connecticut, Idaho, Illinois, Indiana, Louisiana, Massachusetts, Michigan, Minnesota, Montana, New Jersey, New York, Ohio, Utah and Wisconsin coincide.

The statute of the state of Kansas provides for a "court of visitation" which, among other powers, has that of supervision of railroads, and to hear and decide upon its own volition all matters in dispute between an employing railroad corporation and its employes in case of a strike.

The above citations from the sixteenth annual report of the Commissioner of Labor are merely suggestive to the general scope of the publication; it is indeed a most interesting treatise, and with all due allowance for the necessarily inadequate data from which the statistical portion is compiled, it is a highly useful volume that employer and employe may study with profit.

The tin plate rollers employed in the Chester, W. Va., plant of the American Tin Plate Co. walked out last week for the reason that the scale formulated by the company was not the same as that of the Amalgamated Association. President Shaffer counseled the men to return to work pending a settlement and the plant has resumed operation. It is probable that the Amalgamated Association will make an effort to include this plant among the union mills of the American Tin Plate Co.

PERSONAL.

At a meeting of the stockholders of the David Maydole Hammer Co., Utica, N. Y., held recently, Mrs. C. E. Merritt was chosen president to succeed the late Cyrus B. Martin.

Andrew Carnegie arrived in Pittsburg Sunday evening and spent several days in that city this week. On Tuesday he assisted in the dedication of the Carnegie Library at Carnegie, Pa.

P. W. Carothers has been appointed superintendent of the plant of the Columbus Iron & Steel Co., Columbus, O. He succeeds J. C. Thompson.

Lawrence C. Phipps, formerly vice president of the Carnegie Steel Co., returned to his home in Pittsburg last week after an extended tour of the West. He denied the report that he will locate permanently in Denver.

H. M. Whitney, of Montreal, Canada, has resigned the presidency of the Dominion Iron & Steel Co., and will be succeeded by James Ross, president of the Dominion Coal Co.

George G. Forgeot has resigned his position as master mechanic of the Bay View mills of the Illinois Steel Co. to become superintendent of the Scranton, Pa., plant of the Allis-Chalmers Co. George J. Willett will succeed Mr. Forgeot.

Reuben Miller, Jr., general superintendent of the plants of the Crucible Steel Co. of America, Pittsburg, Pa., has resigned. He will be succeeded by G. M. Black, for some years manager of the Black Diamond Works of the Crucible Steel Co.

E. O. Hopkins, who resigns the presidency of the Sloss-Sheffield Steel & Iron Co. on May 1, sails with his family for Europe on June 25.

D. B. Blackburn, Pittsburg, Pa., has resigned as assistant superintendent of the Monongahela River Consolidated Coal & Coke Co.

Benjamin Talbot, inventor of the Talbot continuous open-hearth process, is in the United States.

C. T. Needham, of J. Needham and Sons, Manchester, Eng., who was in the United States for some weeks, recently sailed for Europe after placing some large contracts for zinc. Mr. Needham took a number of orders in this country for billets and sheet bars.

Charles Churchill, of Charles Churchill & Co., Ltd., of London, extensive dealers in machinery, will soon arrive in the United States. He will remain for several weeks and may be addressed at 23 John street, New York.

Walter Crooke, of the Frodingham Iron & Steel Co., Frodingham, Eng., is now in the United States.

Edward N. Hurley, formerly president of the Standard Pneumatic Tool Co., now a director in the Chicago Pneumatic Tool Co., sails for London, Eng., April 17. He will meet President J. W. Duntley in London and complete arrangements for the sale of the International Pneumatic Tool Co., of London, to the Chicago Pneumatic Tool Co. C. E. Walker and C. Booth, of the same company, have sailed for Europe.

The new continuous furnaces of the 8-inch mill at the Bay View plant of the Illinois Steel Co., Bay View, Wis., will be fired up for the first time on May 1. The operation of these furnaces will do away with the services of a number of heaters and will mean a great saving in the cost of production. The improvements are similar to those made to the 9-inch mill some time ago.

The Shaw Electric Crane Co., Muskegon, Mich., is building 18 electric cranes to be erected in the new works of the Colorado Fuel & Iron Co., at Bessemer, Col. A similar order for 12 cranes was placed with the Shaw company some time ago.

The McKiernan Drill Co., of New York, has placed an order with the Bass Foundry & Machine Co., of Ft. Wayne, Ind., for two 1,500-h. p. cross-compound condensing engines.

The American Iron & Steel Mfg. Co., Lebanon, Pa., has granted its puddlers an advance in wages of 25 cents per ton to date from April 1. The puddlers asked for $4.50 per ton, but will receive $4.25.

RESPONSIBILITY FOR ACCIDENTS.

[Condensed from Engineering News.]

Editorial consideration is given to the question, "Should executive officers be held criminally responsible for accidents?" Commenting upon the newspaper demand that some one be held responsible, a sentiment of very general acceptance with the public, the article admits that this is right—to a certain extent. In the case of the tunnel collision in New York, the railway company will without doubt be held responsible for the payment of damages for each person killed or injured in the accident. But the public goes further, and declares that such slaughter is a crime, and that the responsibility for the crime should be brought home to some one, so that he shall receive due punishment. Society punishes the criminal first to deter others from committing a like crime, and second, under the most advanced systems of criminology, to restrain his criminal activity and train him to an honest and law-abiding life again. How do these considerations apply to the engineer whose dam breaks or whose flywheel explodes; to the railway superintendent whose trains meet in a collision, or to the hotel proprietor whose guests suffer death by fire?

The only reason for punishing crime of the class we are considering is to deter others from committing a similar crime; and the real question is whether in any given case such punishments will work for the public benefit in this way. There may be cases where gross and deliberate carelessness on the part of responsible officials where the safety of human life is concerned is such as to justify criminal prosecution; but as a general rule, it will seldom be found possible to so fix the responsibility that either the law or public opinion (when it reaches its sober second thought) will countenance a criminal charge.

Loss of position, injury to professional reputation, mental anxiety and torture—these are some of the penalties which are frequently brought home to the official who finds himself responsible for an accident, even though the responsibility be of such a sort that the courts of law could never fix it upon him.

On November 26 last, the four-story factory of the Penberthy Injector Co., at Detroit, Mich., was wrecked by the explosion of a cylindrical shell boiler in the basement of the building, and some 30 persons lost their lives. An investigation by experts shows that the failure of the boiler was due to poor material and poor riveting; the shell contained too much phosphorus, the rivet holes were unevenly spaced, and had been made to match by a drift-pin; a crack formed in the shell near the seam, and finally the boiler exploded. Now, how can we place the criminal responsibility for the loss of these thirty lives? Can we go back to the boiler shop where the boiler was built ten or a dozen years ago, and find to what extent workmen, foremen, superintendent and owner were severally responsible for the condition of the boiler as originally completed? Must we not inquire also to what extent the inspectors of the boiler were responsible for failure to discover its dangerous condition, and even investigate the propriety of placing a shell boiler in a position where its explosion could work such widespread damage?

There may occur exceptional cases where responsibility for criminal negligence can be brought home to an individual in a manner to justify prosecution and punishment; but in the great majority of cases it will be found that responsibility for the causes leading up to an accident is divided among many men. Careful investigation will also usually show that even when the responsibility can be accurately apportioned, imperfect knowledge, defective systems and failure of subordinates, rather than wilful and deliberate intention to create a source of danger, must fairly be credited against those on whom we find the responsibility to be placed.

What is needed for the investigation of accidents is a competent expert body, such as have been instituted by the Board of Trade in Great Britain, to inquire into railway accidents and boiler explosions. The establishment of such a system of governmental investigation here would effect more in the prevention of accidents than any other possible reform, and its possibilities in the saving of lives and property in other fields are almost equally great. We have the beginning of such a system in this country in the investigations of railway accidents which are undertaken by State Railway Commissions in Massachusetts, Maine, New York and a few other states; and in the investigation of fires made by municipal fire departments and underwriters' agents.

Iron and Steel Institute.

The annual meeting of the Iron and Steel Institute will be held at the Institution of Civil Engineers, Westminster, on Wednesday and Thursday, May 7 and 8. The election of officers and council will take place, and the Bessemer gold medal for 1902 will be presented to F. A. Krupp, of Essen. The following is a list of the papers that are to be submitted: Report by the committee appointed to investigate the nomenclature of metallography; "A New Vacuum Tuyere for Blast Furnaces," by Horace Allen; "The Microstructure of Hardened Steel," by Prof. J. O. Arnold and A. McWilliam; "The Compression of Fuel Before Coking," by J. H. Darby; "Gas from Wood for Use in the Manufacture of Steel," by James Douglas; "A Combined Blast Furnace and Open-Hearth Process," by P. Eyermann; "The Physical and Chemical Properties of Carbon in the Hearth of the Blast Furnace," by W. J. Foster; "Sulphur Contents of Slags and Other Metallurgical Products," by Baron H. von Jüptner; "Elimination of Silicon in the Acid Open-Hearth Furnace," by A. McWilliam and W. H. Hatfield; "Report on Research Work Carried Out During the Past Year," by J. A. Mathews; "The Iron Ore of Brazil," by H. Kilburn Scott; "The Recovery of By-Products in Coking," by J. Thiry; "Brinell's Researches on the Influence of Chemical Composition on the Soundness of Steel Ingots," by Axel Wahlberg.

Good Record for a New Rod Mill.

The fall and spring months, particularly November and March, have been record breaking periods for production in the steel rolling mills of the country for several years. Among rod mills two have been competing for the leadership—Joliet mill No. 2, of the Illinois Steel Co., and Rankin rod mill of the old Consolidated Steel & Wire Co. Another mill is beginning to make records—not that it is showing the largest outputs, but that it has reached a large production in an unusually short time. Something over six months ago the Union Steel Co., at Donora, Pa., started its rod mill. In the week ending April 12, this mill produced an average of 400,890 pounds of No. 5 rods. For a single turn the maximum was 457,780 pounds, and the largest output in 24 hours was 868,575 pounds. When the amount of machinery involved is considered, and the equipment and accessories required to care for an 8,000-h. p. plant, from the boilers down to the sewers, it is a marvel that such records are attained. The successful operation of the Donora plant is creditable both to the management and to the Garrett-Cromwell Engineering Co., who designed the mill and superintended its construction.

The Waukesha Malleable Iron Co., Waukesha, Wis., will shortly erect a large addition to its plant. The new building will be 300 feet long and 70 feet wide.

The Chisholm & Moore Mfg. Co., of Cleveland, announced recently that owing to the increased cost of labor and material their charges for pattern work are advanced to the following basis: Labor, 45 cents an hour; brass castings, 30 cents a pound; white metal castings, 30 cents a pound; gray iron castings, 4 cents a pound.

David M. Glasscock has been appointed receiver for the American Spring & Mfg. Co., Cleveland. The assets of the company are placed at $50,000 and the liabilities at $200,000.

Twelve foundries in the Birmingham, Ala., district have acceded to the demands of the molders in their employ for an advance of 25 cents per day, the new minimum being $3.

F. A. Goodrich & Co., of Detroit, Mich., dealers in pig iron, steel and coke, announce the removal of their offices to the sixth floor of the Majestic Building, where they have larger quarters.

CORROSIBILITY OF STEEL IN CEMENT.

A test to determine the corrosibility of steel embedded in cement has been described in a recent issue of the *Railway and Engineering Review* by Daniel B. Luten, of Lafayette, Ind. A piece of steel rod was turned free from rust in a lathe, and then embedded at one end in cement mortar, half the length of the rod remaining exposed. The piece was then suspended beneath a water spout discharging intermittently so that the rod and cement would be drenched with water for an hour, then dry for several hours. This was continued for one month, then the piece was submerged in water for a month, after which the mortar was broken open, showing the coated portion absolutely free from rust, while the exposed portion was beginning to scale. Although the mortar was not very compact, but rather porous, and not thicker than one inch in any place, yet the steel was protected up to the very edge of the coating and the edge of the rusted portion is very clearly defined and does not encroach even in the slightest upon the coated portion.

Of course, this was a very short-time test. The accompanying half-tone, however, serves as an excellent illustration of the protective qualities of concrete applied to steel. Such a result was to be expected, as it has been abundantly shown by very extended tests that concrete is an excellent preservative coating for steel even when submerged continually in water.

The writer says that the above test was conducted with

STEEL ROD, PART EXPOIED AND PART IMBEDDED IN WET CEMENT

especial reference to securing, if possible, a circulation of carbon dioxide, which is supposed to be the destructive agent in the rusting of steel. The rod was therefore subjected to intermittent wetting with rain water, and to continued immersion in spring water, yet with no effect whatever. It is a well-known fact that railroad spikes driven in wooden ties are protected by the wood from rust below, although the head may be almost entirely eaten away. A railroad spike driven into the piling of a salt-water dock to serve as a step will be eaten away by the action of the salt water until the head may be broken off with the fingers; yet when cut out of the wood, the body of the spike will be nearly perfect, although usually coated with rust. It is common experience that nails driven into fence posts are protected by the wood, long after the exposed portions are eaten away. If wood which readily absorbs 50 per cent of its volume of water will thus protect steel, it would seem to be reasonable that concrete, absorbing less than 5 per cent, should afford better protection.

The Ohio Steel & Iron Specialty Co., of Cuyahoga Falls, O., H. B. Hamlen, manager, has just started its new plant, the main building of which is 70x124 feet. The company will manufacture light shapes, including rails for coal mines.

Attorney Harvey Musser, of Akron, O., who purchased the property of the McNeil Boiler Works in that city at public sale on Feb. 20, has organized a new company under West Virginia laws, with a capital of $250,000. It will be known as the McNeil Boiler Co. The new company took possession of the plant on April 1. J. B. Campbell, who was manager before the receivership and later receiver, has been made general manager. Eastern capitalists are interested and it is their intention to make additions, so that eventually a much larger plant will be operated. The works are now running to full capacity and contracts on hand will occupy them until fall.

The strike of the miners employed by the Rochester and Pittsburg Coal & Iron Co., of Dubois, Pa., has been settled and the miners and coke workers all returned to work last Thursday. The furnaces dependent upon this region for their supply of coke had just made arrangements to secure their supply from the Connellsville and West Virginia coking districts when the strike was declared off.

ASSOCIATION OF AMERICAN STEEL MANUFACTURERS.

The annual meeting of the Association of American Steel Manufacturers, an organization devoted entirely to questions of testing and the standardization of specifications for steel, was held at the Duquesne Hotel, Pittsburg, on Saturday, April 19. Of the 35 companies in the association, only 14 were represented, but the work was not impeded nevertheless. Committees were appointed to carry on the work of further standardizing the various classes of material manufactured by the iron and steel plants of the country and the details of the standardizing of structural shapes will be further worked out. Secretary Albert Ladd Colby, of Bethlehem, Pa., announced that the standards prepared by the American committee of the International Association for Testing Materials are now being generally adopted by the trade.

Officers for the ensuing year were elected as follows: President, A. F. Huston, president of the Lukens Iron & Steel Co., Coatesville, Pa.; vice president, John McLeod, assistant to the president of the Carnegie Steel Co., American Steel Hoop Co. and the National Steel Co.; secretary and treasurer, Albert Ladd Colby, metallurgical engineer of the Bethlehem Steel Co., South Bethlehem, Pa. The following concerns were represented: American Steel & Wire Co., Chicago, Ill.; American Steel Hoop Co., Pittsburg; Bethlehem Steel Co, South Bethlehem, Pa.; Carnegie Steel Co., Pittsburg; Central Iron & Steel Co., Harrisburg, Pa.; Crucible Steel Co. of America, Pittsburg; Illinois Steel Co., Chicago; Jones & Laughlins Ltd., Pittsburg; Lukens Iron & Steel Co., Coatesville, Pa.; Maryland Steel Co., Sparrows Point, Md.; National Steel Co., Pittsburg; National Tube Co., Pittsburg; Pennsylvania Steel Co., Steelton, Pa.

Some of the principal engine sales of the Allis-Chalmers Co. in the month of March are noted below: Virginia Electrical Railway & Development Co., Richmond, Va., one 20-inch and 40x42 steeple compound direct-coupled Reynolds-Corliss engine; Milwaukee Electric Light & Railway Co., Milwaukee, two 28-inch and 60x48 vertical cross-compound direct-coupled Reynolds-Corliss engines; Republic Iron & Steel Co., Youngstown, O., vertical round frame compound blowing engine, steam cylinders 46-inch and 88x60, air cylinders, 76-inch and 76x60; Fond Du Lac Street Railway & Light Co., Fond Du Lac, Wis., 20-inch and 40x48 1890 frame cross-compound direct-coupled Reynolds-Corliss engine; Milwaukee Harvester Co., Milwaukee, Wis., 22-inch and 44x42 1890 frame cross-compound direct-coupled Reynolds-Corliss engine; Harbison-Walker Co., Pittsburg, 22x42 1890 frame Reynolds-Corliss engine; Henry Disston & Sons, Philadelphia, 24x48 1890 frame Reynolds-Corliss engine; Twin City Rapid Transit Co., Minneapolis, Minn., 46-inch and 94x60 vertical cross-compound direct-coupled Reynolds-Corliss engine (second order); Richmond Passenger & Power Co., Richmond, Va., one 18-inch and 36x48 1890 frame cross-compound direct-coupled Reynolds-Corliss engine; Continental Bolt & Iron Co., Chicago, one 16x36 1890 frame Reynolds-Corliss engine; Oriental Consolidated Mining Co., Korea, one 16-inch and 28x42 tandem girder frame Corliss engine; P. L. Kimberly, W. Dreyfus & A. E. Nusbaum, Wyoming, one 14-inch and 24x42 tandem compound non-condensing Corliss engine; Pennsylvania Railroad Co., one horizontal cross-compound Riedler compressor, air cylinders 15-inch and 24x36, steam 14-inch and 24x36, capacity 1,500 cubic feet per minute to 100 pounds pressure; Delaware & Hudson Co., Scranton, Pa., two 28x48 hoisting engines, one 26x48 slope engine.

The Pennsylvania Steel Co., Harrisburg, Pa., has been awarded the contract for the structural work of the northernmost of the two new bridges to be erected over the Schuylkill river in connection with the West Philadelphia improvements by the Pennsylvania Railroad Co. There will be three large spans in the bridge, one 153 feet in length and the other two each 160 feet long.

With the improvements now under way by the Champion Rivet Co., of Cleveland, both as regards additions to buildings and installation of special new machinery, the company expects to be in as good shape to supply the rivet consuming trade with good rivets as any concern in the world. This concern devotes its entire attention to the manufacture of high grade rivets.

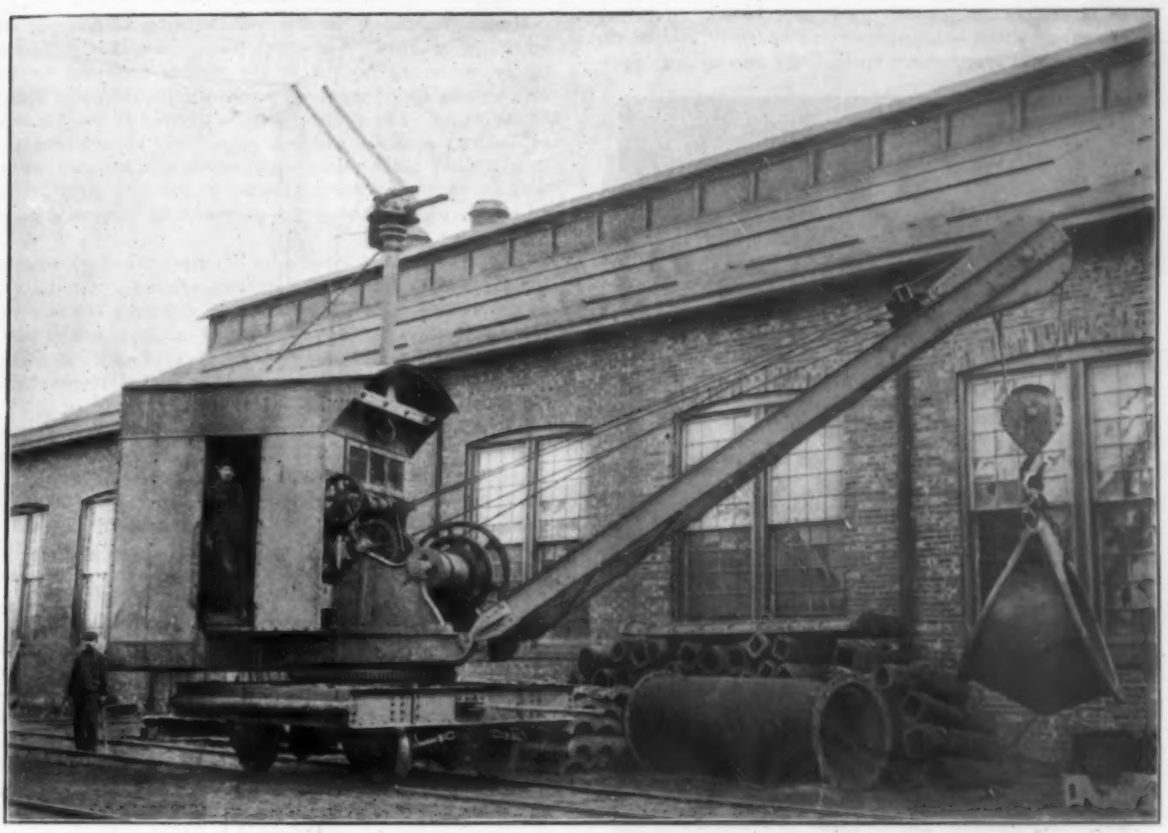
AN ELECTRICALLY-DRIVEN LOCOMOTIVE CRANE.

The Brown Hoisting Machinery Co., of Cleveland, has recently built and installed at the plant of the Lorain Foundry Co., at Lorain, O., an electric locomotive crane. The crane as built to the order of General Manager Phelps, of the Lorain Foundry Co., was a novel departure from current practice, but the design has been duplicated for use at the plant of the General Electric Co., at Schenectady, N. Y., since its adoption at Lorain, and the maufacturers report a number of inquiries regarding the introduction of the machine in other establishments. The crane is attached to a substantial steel truck constructed to travel on tracks of standard gauge in order to utilize the ordinary railroad track in the yards and buildings, and is found highly serviceable as a substitute for a switching engine. A house of corrugated iron is built over the mechanism to protect it and the operator from the weather.

It will be seen that the main platform of the crane is formed of a heavy center casting, to which is bolted a frame made up of steel beams, the axle-bearing brackets being fastened to the underside of the steel frame and the center casting carrying on its top the support for the steel slip ring through which the crane is rotated upon its axis. Above this is the rotating bed or housing on which all of the mechanism is assembled. The axles are made out of 6½-inch hammered steel, turned down at the bearings. The power is obtained from overhead wires through the ordinary trolley poles and conducted to a 75-h. p. motor. The motion is applied to the load, the variation in the jib radius, rotation of the boom, or propulsion of the crane along the track, by means of a system of clutches, the power needed for this purpose being sufficient to effect hoisting, rotating and traveling simultaneously.

The rotating mechanism on this crane consists of a large wrought steel ring, having spur teeth cut on its periphery and fitting loosely upon a turned path or bed provided for it on the main frame or truck. The rollers which support the rotating bed bear on top of this loose ring and the friction thus developed tends to prevent its turning. The upper surface or roller path of this steel ring is beveled, and the steel rollers are conical in shape, thus giving a proper bearing in the rotating movement of the crane. A pinion engages with this slip ring and is driven by a gear wheel, on the upper end of its vertical shaft, which in turn gears into one or the other of two bevel wheels mounted on a transverse horizontal shaft, each operated by a friction clutch. Rotation of the crane is effected in any direction by throwing in either one or the other of these two clutches, thereby causing the pinion to turn. The effect of this is to cause the pinion to tend to travel upon the periphery of the slip ring and this will be the result if the motion be made slowly and gradually. If, however, the rotating power be thrown suddenly into gear, the inertia of the burden will be greater than the frictional resistance of the slip ring which will therefore rotate backwards until the inertia of the mass has been overcome, when the crane will begin to rotate and the ring will cease to slip. This feature is not only a safety device but serves to give the operator greater freedom in his work; and the increased facilities for rapid handling are as noteworthy advantages as the attendant reduction in the cost of repairs.

The power is applied to both of the truck axles by means of bevel gears. Owing to the overturning tendency of the load which may throw the whole weight on one pair of truck wheels and leave the other pair unloaded; and that the load may be at any point in the whole circle of rotation, it is necessary to apply power to all four of the truck wheels, to make sure that there will always be sufficient tractive force to propel the crane under all conditions, especially on tracks that are poor or wet, as well as on curves and grades.



TEN-TON ELECTRIC LOCOMOTIVE CRANE IN YARD OF THE LORAIN FOUNDRY CO., LORAIN, O.

The jib has a variable radius from the center of the truck in any direction of from 8 feet to 26 feet 6 inches, and will handle 10 tons at a distance of 14 to 15 feet. At the extreme radius of 26 feet 6 inches the crane will hoist some 9,000 pounds. These weights are the unclamped carrying capacity; greater stability can be obtained by the use of the wheel clips seen under the beam of the truck.

The "jaw" as well as the "cone" style of clutch has been discarded in this type of crane, the jaw clutch being considered objectionable on account of the shock to the mechanism unless the motion of the parts is nearly stopped before the clutch is applied, and the "cones" having little durability under the severe pressure they are liable to undergo in this service. The Brown Hoisting Machinery Co. has therefore developed a modified

form of disc friction clutch which has proved thoroughly satisfactory.

All the gears are of steel and the shaft bearings are bushed with bronze. The one-inch hoisting rope is of plow steel and the several parts of the machine are manufactured to standard gauges and are interchangeable as far as possible with the other styles of 10-ton cranes made by the same company.

ELECTRICAL TURNING DEVICE FOR POWER HAMMERS AND HYDRAULIC PRESSES.

From *Stahl und Eisen* we take the following, with the accompanying illustrations: "The extraordinary advancement made in the past few years in the adoption of electrical lifting devices is due to the facility with which electric motors can be operated in conjunction with the various kinds of mechanical devices. The electric motor has assisted in solving many problems and this is true of the turning device for power hammers and hydraulic presses which was recently installed in the forging works of John Cockerill in Seraing, Belgium, and which is described herewith. As is well known, in forging heavy sections with power hammers and hydraulic presses, the section is turned lengthwise. To facilitate this turning operation an endless chain, operating on a sprocket wheel, is attached to a hook hanging from the traveling crane and the section hangs in the lower loop of the chain and is turned by means of a lever. This turning is easily accomplished with small sections, but in forging heavy guns and shafts for marine and steam engines in weights up to 50 tons the turning by hand is well nigh impossible.

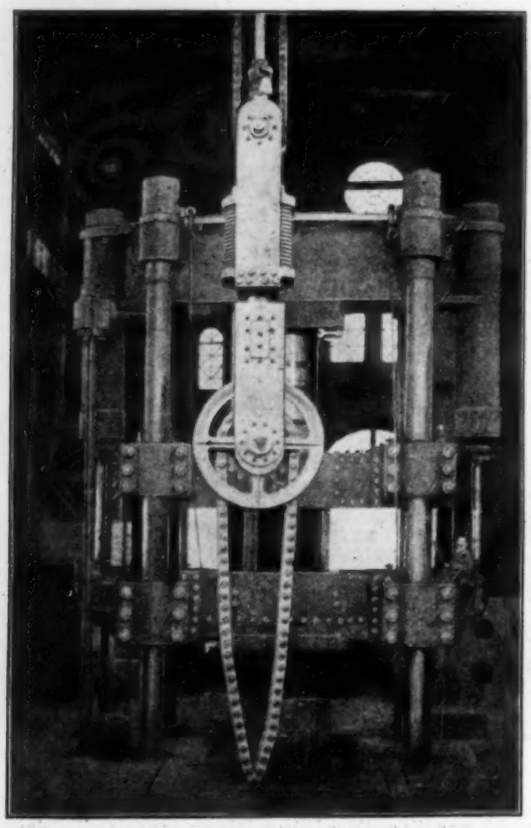


FIG. 1.—ELECTRICAL TURNING DEVICE FOR HAMMERS AND PRESSES

"Fig. 1 illustrates the electrical turning device adjusted in front of a hydraulic press, while Figs. 2 and 3 show sectional and general views. This device is adjusted and hangs from the chain of the traveling crane in the place of the hook and endless chain arrangement. The endless chain operates on the sprocket wheel A which is adjusted to shaft D and is used for turning the section to be forged. On the same shaft is adjusted a cone wheel B which interlocks with a conical slot C on the vertical shaft. One complete revolution of the vertical shaft also results in one complete revolution of the section to be forged or pressed. In order to bring about this operation the vertical shaft extends to the running gear of the traveling crane, the motive power being furnished by an electric motor adjusted to the traveling crane running gear. The vertical shaft is provided also with two universal joints H and I. The chain attached to the crane is double and is provided with two sprocket wheels K and L. Four springs M are set in between the pulley shaft, on which are adjusted sprocket wheels K and L and the lower portion of the turning device, for the purpose of preventing the jarring of the running gear of the traveling crane and the craneways when a particularly heavy section is being forged.

"Each of the four springs consists of fifteen convex and fifteen concave steel plate rings which are set upon one another. The springs are very substantial and require very little room for setting into place. In addition two hooks, FF, are adjusted to the lower portion of the turning device by means of which ordinary loads can be hooked up and transported."

TRADE PUBLICATIONS.

Messrs. Wyman & Gordon, manufacturers of forgings and quick acting vises, Worcester, Mass., have added another highly interesting booklet to the number published by this firm treating upon the famous pioneers in the industrial history of the world. The present essay is devoted to the life work of Robert Fulton and has been prepared by Dwight Goddard; it is a brief but entertaining production, illustrated with a portrait of the celebrated engineer with the story of his efforts in the early days of commercially successful steam navigation.

Catalogue P. M.-1, contains a description with dimensions, capacities, etc., of the pulley molding machines manufactured by E. A. Delano, of Chicago. These machines are manufactured in a number of sizes with a range of from 3 to 72 inches in pulley diameters. The entire line is thoroughly illustrated with some excellent half-tones and a list of representative users is added.

The Garden City Fan Co., of Chicago, manufacturer of exhausters, pressure blowers, ventilating fans, hot blast apparatus, multiple boring machines, centrifugal mills, etc., has favored us with a copy of catalogue No. 22. This is an annual publication and covers some 120 pages descriptive of the numerous product of this company. The several machines are fully set forth with many engravings and the catalogue is unusually complete in every detail.

A varied assortment of pneumatic equipment, including chipping, calking and riveting hammers, yoke riveters, rotary drills, breast drills, foundry rammers, air hoists, etc., is shown in the new general catalogue of the Philadelphia Pneumatic Tool Co., of Philadelphia. The work is beautifully illustrated with many fine half-tones showing the tools in actual operation on various lines of shop usefulness. An interesting and valuable feature of the catalogue is the incorporation of tables of capacities, weights, dimensions, air consumption, etc., in connection with the different tools; a convenience of considerable importance to buyers and users of pneumatic equipment.

The Hilles & Jones Co., of Wilmington, Del., has issued a new catalogue to be known as "S." This is devoted to machine tools for the working of plates, bars, and other structural shapes. The machines are designed for operation with a choice of various methods of power application, either by belt or direct connected motor or steam engine. The half-tones are skillfully prepared and the illustrations set forth the merits of the machines in commendable style; in addition to this feature, the pamphlet is bound in an unusual manner, the covers being made of stiffened sacking and the imprint of firm and book title is a close imitation of the effort of the ordinary shipping clerk with a stencil plate.

Bulletin No. 7 is presented by Pawling & Harnischfeger, of Milwaukee, Wis., in the belief that it will afford additional evidence of the great value of traveling electric hoists for the economical and rapid handling of material. These traveling hoists can be quickly installed on I-beam runways and the machines can be made to take either a straight or curved runway; the advantage of the curved track consisting in its availability for covering a large part of an extensive plant. The machines are suitable for inside and outdoor service; in

the latter case the mechanism is covered with an iron casing and the operator's cage housed in sash. The bulletin gives a list of representative firms using this make of hoist which is evidence that this peculiar application of electricity is in no sense an experimental affair. A number of half-tones illustrate the hoists in service in some large steel plants and machine shops.

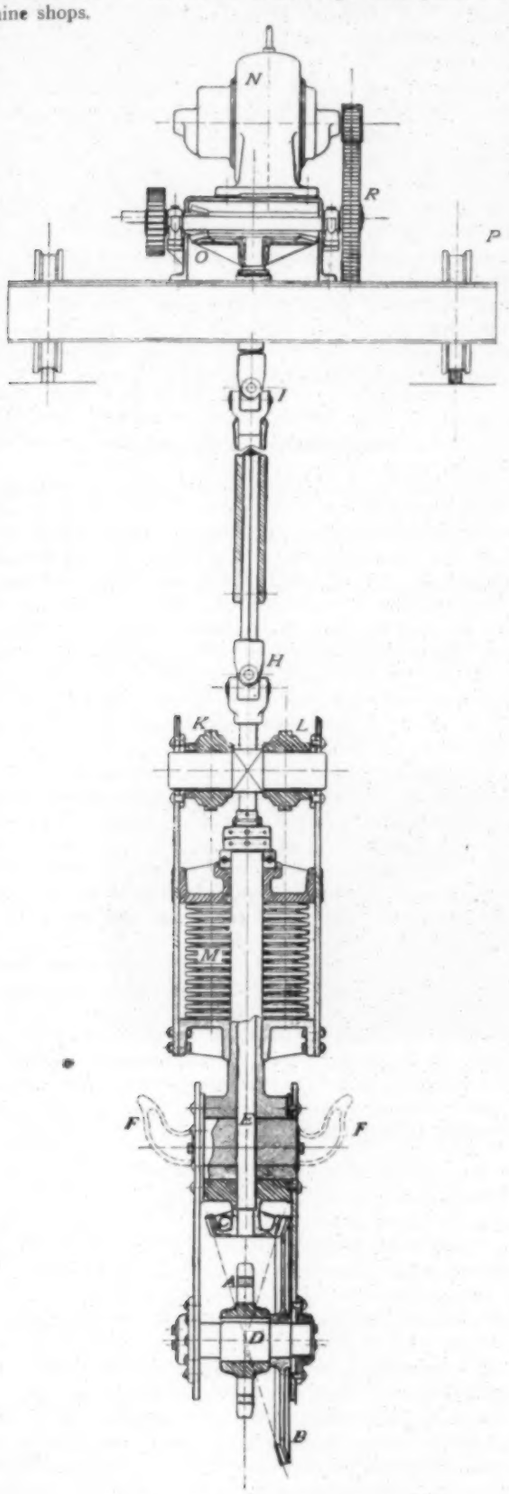


FIG. 2.—SECTIONAL VIEW.

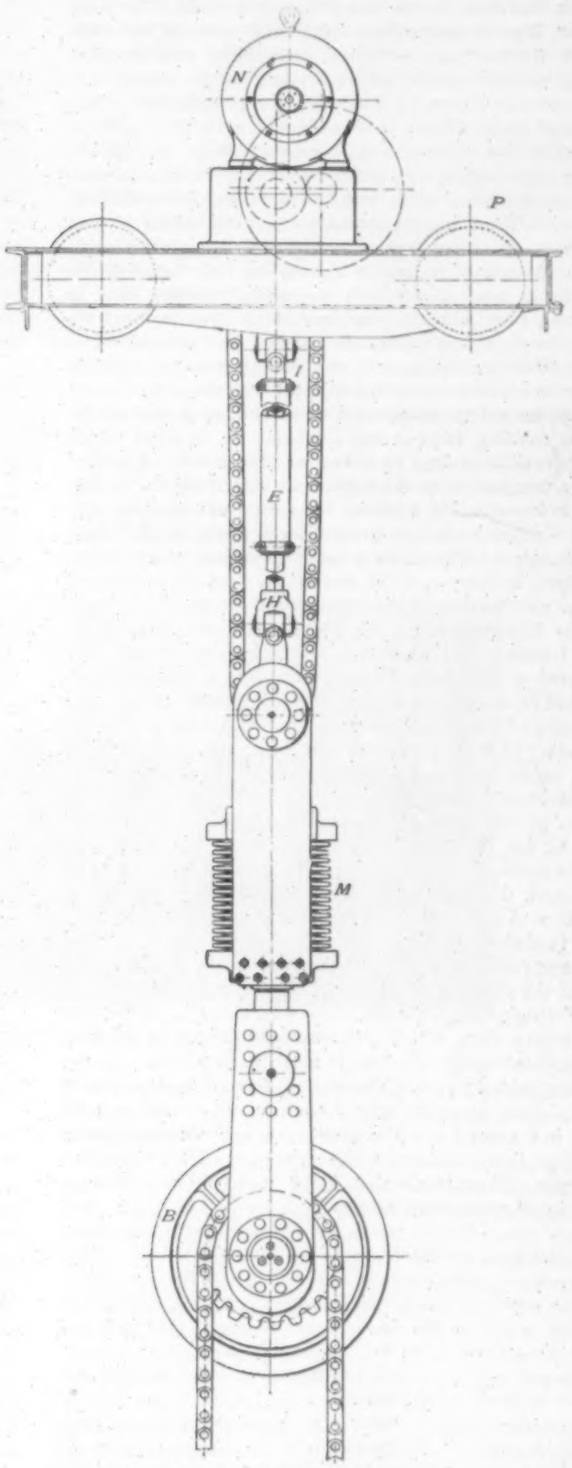


FIG. 3.—GENERAL VIEW.

The Cleveland Punch & Shear Works Co., of Cleveland, is sending out catalogue No. 5, devoted to power punches and shears, angle bending rolls, plate bending rolls, plate straightening rolls, radial drills, suspension drills, post drills, rotary planers, plate planers, angle shears, cold sawing machines, forging and blanking presses, hydraulic presses, etc. The catalogue contains 118 pages, is well bound and is an admirable specimen of three-color printing. Each of the machines, many of the attachments and portions of the manufacturing plant are illustrated with half-tones.

The steam specialties of the Burrows Mfg. Co., of Williamsport, Pa., are given prominence in a recent catalogue, and a number of testimonials are published in a separate pamphlet. The catalogue has a series of descriptive articles treating upon the construction and operation of the Burrows' automatic pump regulator and low water alarm, the automatic feed water regulator and low water alarm, back pressure regulator, high and low water alarm, automatic lever damper regulator and the improved Kellam damper regulator. A general line of pumps and heaters is supplied by the same company.

The foundry of the Union Pacific Railroad at Omaha, Neb., has been shut down for an indefinite period.

REMODELING BRITISH STEEL WORKS.

A good deal has been said for some time past of the effects of foreign competition in the iron and steel trades, and particularly as to the remodeling of plants which, is was stated, would become inoperative, if the iron and steel trade of this country was to face successfully its powerful competitors.

It may, therefore, not be inopportune to enquire as to what has been done to meet these conditions, and we find that although the past two or three years have seen no very startling innovations, the principal plants of the country are being gradually altered to insure greater outputs and reduce the cost of labor. These improvements consist principally in an increased size of furnaces and converters, larger and quicker running mills dealing with larger ingots, and the gradual displacement of manual labor in all departments by mechanical appliances. Thus, in some works, we find the casting pit and hand stripping of ingots has been entirely done away with, and the American system of casting on cars adopted, the ingots being taken direct to a mechanical stripper, thus at once doing away with the large amount of labor required for setting the pit and stripping the ingots. The gradual introduction of electro motors into steel works' practice, enabling the distribution of power in any quantity with the greatest ease, is slowly, but surely, doing much to revolutionize steel works' practice, enabling labor-saving appliances to be used, which were impossible so long as steam was the source of power; and in a few years a works without its central electric station will be unknown. The tendency for some years now has been for the Siemens process to gradually supersede the Bessemer, and although recently we have heard of various proposals for new plants, in every case the project has been for a Siemens, or some modification of the open-hearth practice.

In the Siemens process we find the tendency is to adopt larger furnaces, and whereas a few years ago 25 tons was considered a very large furnace, now 50-ton furnaces have been built or are being projected at many leading works. The advantages of these large furnaces are that for a given output the number of men is reduced, and consequently the cost per ton of ingots decreased. The advantages, however, are not all in favor of the large furnace, as in dealing with such large units as 50 tons of steel, the difficulty of passing a regular supply of hot ingots to the mills is greatly increased, and, with the greatest care, it is often difficult to prevent a glut of ingots, with the result that a certain proportion must be allowed to cool and have to be reheated at an additional cost.

This is always the case, more or less, but it is more marked with large rather than medium-sized furnaces. Again, in the event of the charge of steel not being of the quality required, either through some accidental cause—carelessness on the part of the men, a thing which will sometimes happen in the very best regulated works, the loss is much greater with a 50-ton heat than with 25 tons. The size of furnace will no doubt largely depend upon the special trade of the works, and although in a general way the tendency is undoubtedly towards these large furnaces, many works' managers of large practical experience still maintain that 25 to 30 tons gives the best results in all round practical work.

Several of our leading works have or are about to introduce the Wellman or similar charging machines into their works, an innovation which cannot fail to be a great advantage, from the point of view of both masters and men. The chief drawback to this, in the case of many works, is that it entails a large expenditure of capital, apart from the cost of the machine, in altering the existing staging to carry the machine and enable it to do its work efficiently.

In Bessemer practice there is no noticeable change, those who are bringing their plants up to date being content to increase the size of the converter and save labor by car casting and mechanical stripping. Recently, also, two processes have been brought prominently before the steel world and have received considerable attention from steel manufacturers. They may both be regarded as modifications of the open-hearth steel process, and in the case of the Bertrand Thiel the operation is conducted in two fixed Siemens furnaces, and in the case of the Talbot continuous process in a modified form of Wellman tilting furnace.

Turning now to the after treatment of steel, very considerable progress has been made in investigating the best heat treatment for given classes of steel for specific purposes, and the use of the Chatelier pyrometer is now becoming an important thing in many works' practice. In some works, these pyrometers, fitted with automatic recorders, are connected to annealing furnaces where large steel castings, forgings, etc., have to be annealed, and an exact record of the heat treatment of each is thus obtained. In this heat treatment, the microscope, in conjunction with chemical analysis and mechanical tests, is leading to excellent results, and a most important field of research is being opened. Another direction where accurate analysis may come to the assistance of steel works' practice is in the systematic analysis of producer-gases to see that the coal is being gasified under proper conditions. Many thousands of tons of coal are wasted annually in gas producers owing to the introduction of too much air in proportion to steam, improper stoking, etc., all of which could be controlled by taking frequent samples of the gas from each producer and average samples from the gas main. This could be done at a trifling cost, which would be repaid many times over in most of our large works, but, to be useful, the samples must be taken continuously over the entire day and not at irregular intervals.—[London Iron and Coal Trades Review.

Joseph Wharton, of Philadelphia.

In an appreciative sketch of Joseph Wharton, one of the most prominent of Eastern iron masters, the New York *Commercial* says: "Although just past his seventy-sixth birthday, he has greater physical and mental vigor than most men of 50, and far more enterprise. With an accumulated fortune of many millions, which he himself earned, Mr. Wharton continues to work as hard as though his daily bread were at stake. No undertaking that an individual can accomplish is too big for Mr. Wharton. He embarks in enterprises that young men might well take up for a life work. For the past year he has been developing a great iron industry at Port Oram, N. J., where he bought the rich ore beds. There he has just put in blast a 450-ton modern furnace, in addition to an old furnace that he remodeled; and he is now erecting a third furnace that will have 450 tons capacity. To provide his own fuel Mr. Wharton has bought a large tract of coal land in Indiana county, Pa., where he intends to put up 150 coke ovens. It is understood that he has invested about $7,000,000 in this iron-coke enterprise, through which he becomes probably the largest individual iron master in the United States. For many years Joseph Wharton was the heaviest owner in the Bethlehem Steel Co., and he took the responsible part in the negotiation for its sale to Charles M. Schwab. At one point it was suggested that only a majority of the stock be included in the deal. Mr. Wharton promptly declared that if his 80,000 shares were wanted every other person who held a single share of Bethlehem must be given the same price. Otherwise, he said, the negotiation was off."

The General Electric Co.'s Schenectady, N. Y., shops were practically closed down for a portion of last week by a strike originating in the polishing department. Men in other departments went out on sympathy strikes until on Saturday, April 19, nearly 6,000 were idle. A conference between the company's officers and the strikers ended in the declaring off of the strike Saturday afternoon, the following statement being issued, signed by the representatives of the two sides: "The difficulty with the employes of the company has been compromised on the following basis: All employes are to return to work on Monday morning as if nothing had occurred, with a definite promise on the part of the management that the dispute over piecework prices in the polishing department will be taken up and adjusted promptly on an equitable basis."

The 1902 catalogue of Rumsey & Co., Ltd., manufacturers of hydraulic and pumping machinery for all purposes, Seneca Falls, N. Y., is the fifty-third edition and contains 256 pages bound in red cloth. The present edition includes a number of useful rules and tables together with a telegraphic cipher code. The firm calls attention to the change in many of the list prices and asks that old catalogues be destroyed or the lists altered to conform to the new.

THE FOUNDRY OF JOHN LANG & SONS, JOHNSTONE, SCOTLAND.

We write and we talk a great deal about modern foundries in America, forgetting at the same time that the greatest number of plants engaged in this trade are anything but modern. We are also liable to overlook the fact that other countries have nice shops, well equipped in every way, just as we have. As an example of this we show this month some illustrations from the foundry of John Lang & Sons, at Johnstone, Scotland. This company for many years purchased their castings, used in the manufacture of machine tools, from local foundries, but the uncertainty of deliveries as well as the quality of the castings recently induced them to erect a foundry for their own use.

This is located on the Greenock branch of the Glasgow & Southwestern Railway, and commands excellent shipping facilities. It is connected to the machine shop by means of the industrial railway shown on plan, so that castings can readily be transferred. All the intervening ground belongs to the firm, so there is plenty of room for future extensions.

The main building is 253 feet by 158 feet. The offices, engine house, boiler house, cupolas, and core ovens are under one roof. On the southeast side, under a separate roof, are the lavatory, and workmen's lockers, which will be referred to later on.

The height of the main building from floor level to eaves is 26 feet, and to the apex of the ridges is 43½ feet. It is erected on the steel skeleton principle, having 78 steel pillars supporting the roof on three sides independently of the walls. The pillars are steel column joists of H section, 16 inches by 6 inches, weighing 68 pounds per foot, embedded in concrete blocks 4 feet 6 inches by 4 feet 6 inches by 3 feet deep, dividing the shop into five bays each of 30 feet clear span. Running longitudinally along the tops of the steel columns are 12-inch by 6-inch steel H beams, 54 pounds per foot, supporting the roof.

FIG. 1.—FOUNDRY OF JOHN LANG & SONS, JOHNSTONE, SCOTLAND.

Provision for light and ventilation is a particular feature of the whole works. The roof being built on the saw-tooth principle, there is a glass skylight in each bay 253 feet long by 14 feet wide, thus giving a total area of roof lights of 17,710 square feet, while the side windows have a total area of 5,290 square feet, giving a grand total of 23,000 square feet of lighting surface, making the interior of the foundry almost as light by daylight as it is outside, a result, we think, which is not surpassed anywhere. The glass in the roof lights is of a special construction, being of one-quarter rough cast plate glass, having a wire mesh cast in, thus increasing its strength and enabling it to stand the roughest usage.

Ventilation is provided by means of louvres of a peculiar construction, allowing the free egress of vitiated air, dust, smoke and gases, while preventing rain or snow from drifting in. These ventilators are each three feet deep, and are placed at the apex of each of the bays, and run the whole length of the building. Special precautions are taken to minimize the amount of smoke, dust, and gas inside the foundry, and any arising from the casting or molds passes rapidly away through the ventilators.

Four of the bays are suitable for the erection of overhead traveling cranes, the other being occupied by the engine room, cupolas, etc. In addition to the traveling cranes, provision has been made for installing a number of small swing cranes; these are bolted to the steel pillars, and have a radius of about ten feet, so that one crane swings within the radius of the other. The firm are considering the advisability of attaching pneumatic hoists to these cranes, with a complete installation of air compressors, pipes, and fittings.

For transferring the castings to the cleaning department, there is an equipment of Hudson's portable rails with trucks to suit. The rails are in sections of 15 feet long, connected by steel cross ties; the gauge is 24 inches. The weight of each section being only 90 pounds, they can easily be taken up and laid down wherever they may be required about the foundry. Of course, in a foundry of this class, it is impossible to lay down a permanent railway on the molding floor; but this difficulty was of easy solution.

The trucks have a channel iron frame and steel wheels. The dimensions are 5 feet 6 inches long by 2 feet 6 inches broad by 1 foot 5½ inches high, the diameter of wheels being 15 inches. They are each constructed to carry a weight of three tons.

The portable railway is connected to the permanent railway system running in the yard along the whole front of the foundry, through the shop, and making connection at the other end with the industrial railway to the machine shop. It is of great convenience in carrying all the supplies requisite for the foundry from the railway trucks which are discharged in the yard, as well as in transferring small ladles or other material throughout the foundry.

Storage for raw material is provided in sheds of large capacity erected in the yard. Into these the railway cars discharge sand, coal, coke, limestone, pig iron, etc. An Eberhardt sand mixer is provided, close to which is a German made core machine, which turns out cores of any shape corresponding to the die let into the surface of the table. The length of the cores can be varied by means of an adjustable stop on the hand wheel and when once set the machine is ready to turn out an indefinite quantity of cores exactly similar in length and shape.

In the cleaning room of the foundry are the rumblers for small castings. These are of the Stover type, having exhaust pipes leading all dust outside of the building. For making and repairing the tools and flasks, a smith's fire, fitters' benches, and several drilling machines are provided.

The floor of the foundry has an average depth of 4½ feet of sand. There is no pit, as the castings to be made are not of a size to demand this, though provision has been made to take care of a heavier class of work, if necessary. Many of the castings required are consumed in large quantities and for such molding machines both English and American are used.

Another innovation which this firm has introduced into its foundry is snap flasks of the variety common in this country. British foundries are beginning to recognize the value of these

for turning out small castings and are conceding that a greater output can be obtained therefrom for this class of work than from the heavy iron flask. The greater part of the work is, of course, too heavy for snap work and here iron boxes are employed. These are perfectly interchangeable, a step in the right direction.

At the side of the engine room is erected the cupola and receiver. This is one of Littleton's patent cupolas, supplied by the Sturtevant Engineering Co., who also supplied the blower. The cupola has a melting capacity of five tons per hour under ordinary working conditions. It is 60½ inches outside diameter and 42 inches inside diameter. The height from floor level to charging door is 20 feet. The upper portion of the cupola is lined with hollow cast iron bricks, and the blast is introduced at a high level into the annular space formed by them. Two or more courses of these bricks communicate with each other by means of an opening in the adjoining bricks, and the blast, after passing round the cupola two or more times, is taken to the tuyeres. The hearth is contracted so that a small bed charge only is required. By this method it is claimed that the cupola produces hot fluid iron rapidly with a minimum amount of fuel, and requires only a moderate pressure of blast for the purpose, thereby reducing the power absorbed in driving the fan. The cast iron bricks stand the wear and tear incidental to charging much better than the fire bricks usually employed, so that the continual expense of re-lining the cupola is very much reduced. The cupola is fitted with a drop bottom, and is connected at the front to a receiver standing 5 feet 7½

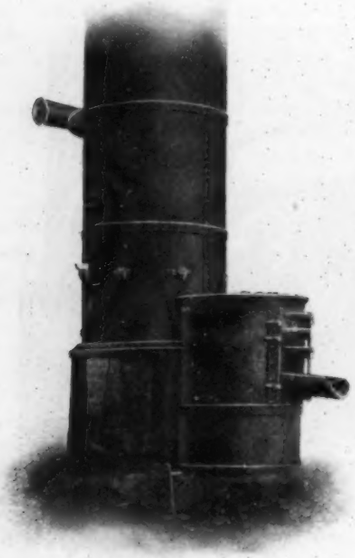


FIG. 2.—LITTLETON CUPOLA.

inches high, the outside diameter of which is 3 feet 6 inches, having a capacity of about 45 hundred-weight of melted metal.

The charging platform of the cupolas has a floor of iron plates, and is entirely under cover, its roof being part of the main roof of the foundry. The floor has been made of sufficient capacity and strength to hold several days' supply of iron, coke, and limestone, which can be stored on it, so that in inclement weather there is no necessity for the men being exposed while bringing in supplies from the yard. An elevator of modern design is provided.

As already mentioned, one of the aims the designer of this foundry had in view was to minimize as much as possible the smoke so commonly met with, and this object has been attained by heating the core ovens by means of gas generated in a producer close to the boiler and equally conveniently situated for receiving its coal supply from the railway cars. The producer is 5 feet 6 inches outside diameter, lined inside with firebrick, the inside diameter being 4 feet. It stands 8 feet high, and is built on a concrete foundation. It is fed with ordinary slack, charged through the hopper on top, and consumes on an average about two hundred-weight per hour. It is a water-bottom producer, the clinkers falling into the trough at the bottom, and has been in continuous daily operation for a period of four months without requiring to be opened out for repairs.

The gas is conveyed from the producer to the ovens by means of a sheet iron pipe lined with firebrick; the inside diameter is 12 inches. This pipe is provided with a safety valve, in the shape of an explosion door, which, in the event of the gas becoming ignited and exploding inside the pipe, flies open, thus preventing any damage being done to the producer or pipes. Admission of the gas to the mixing chamber is regulated by means of special valve. The mixing chamber is of firebrick built inside the stoves, into which the necessary air to complete combustion is admitted from the outside. This is controlled by means of dampers hung in frames on the outside wall.

The core ovens are two in number, with arched tops. Each is 30 feet long by 9 feet 10 inches wide by 7 feet 6 inches high to the spring of the arch and 9 feet to the center of the arch. The side walls are of 14-inch and the center wall of 18-inch brickwork, bound together by means of seven buckstaves on each side, formed of old rails. These are built into the foundation of the walls on bottom, and are secured on top by 1¼-inch bolts passing through the brickwork arches, binding each pair of rails together, and forming the whole into a rigid structure proof against any ordinary strains due to heating and cooling.

The doors are of ¼-inch steel plate, well stiffened with steel angles, and are suspended from an 8-inch by 6-inch H beam erected over the front of the ovens by means of a wire rope passing through pulleys fastened to the beams and having counterweights at the ends to balance them when hoisted up. The doors are kept in position by guide rails at the sides.

One side of each of the ovens is taken up by racks. The core carriages are built of 9-inch by 3-inch channel steel, and are 10 feet long by 5 feet 6 inches wide, strongly braced on top with flat-iron bars. The wheels are of cast iron, 15 inches diameter, and are placed between the two 9-inch by 3-inch channels bars forming the sides of the core carriage. The axles run in channels formed by flat-iron straps riveted to the bottom of each side bar. This enables the carriages to be easily run in and out of the ovens.

The waste gases from the core ovens are led away through openings at the front ends provided with dampers to regulate the draft and pass on through the main flue to the chimney stack, which also serves the boiler. In addition to the large ovens already described, small core ovens of the Millett type are also provided. These are erected close to the large ovens and are perfectly self-contained, and semi-portable, so that they can easily be moved to any position found most convenient. This oven is of the following dimensions. Height, 51 inches; width, 33 inches; depth, 30 inches; area of firebox, 114 square inches; weight, 700 pounds.

The front is made of cast iron, with wrought iron pins and handles, and the sides and back are of galvanized iron, and lined with firebrick. It is provided with four swinging shelves, which may be opened or closed independently of each other. When any shelf is swung open its rear door closes the opening, thereby retaining the heat in the oven, and the drying of the cores on any of the other shelves is not interfered with. One of these doors is 5 inches high, two are 8 inches high, and one for larger cores is 18 inches high.

Electricity is used throughout for lighting the plant and the comforts and convenience of the workmen have been looked after, as is shown in the facilities provided. A well ventilated dressing room is at their disposal, where street clothes may be kept free from the dirt and smoke of the shop. The timekeeper's office is furnished with automatic recording instruments, which are used by all employes. One other indication of the desire of the owners to be of service to their employes deserves to be specially mentioned before concluding. With a view to assist the men to keep in touch with the most recent developments in engineering and foundry practice, Messrs. Lang have instituted a circulating library system, consisting of all the leading British and American publications dealing with such matters. These journals are subscribed for by the firm, and are under the charge of the foreman, who circulates them among the men. This privilege is much appreciated, and constitutes a practice which the majority of American foundries could follow to their own advantage.

The following rules govern the foundry of Messrs. Lang:

Fifty-four hours shall constitute a week's work, and wages will be paid weekly on Fridays at dinner-time.

Meal hours to be the same as in other departments of the works.

Two minutes before each start the whistle will be blown, when it is expected each workman will prepare so as to be ready for starting immediately the second whistle is sounded, exactly at time.

No one to stop work or to prepare to leave the shop till the whistle blows.

An allowance of three minutes will be made in coming to work in the morning; but such an allowance will not be made at meal times, and in case of deduction from time, no less than one quarter of an hour will be deducted in each particular instance.

Every emplove shall endeavor to work peaceably and harmoniously with all his fellow workmen.

Every workman shall be paid according to his ability.

Punctuality and regularity on the part of all will be considered indispensable.

Notify the foreman when desiring to be absent; and, when unexpectedly detained from work, send word as soon as possible.

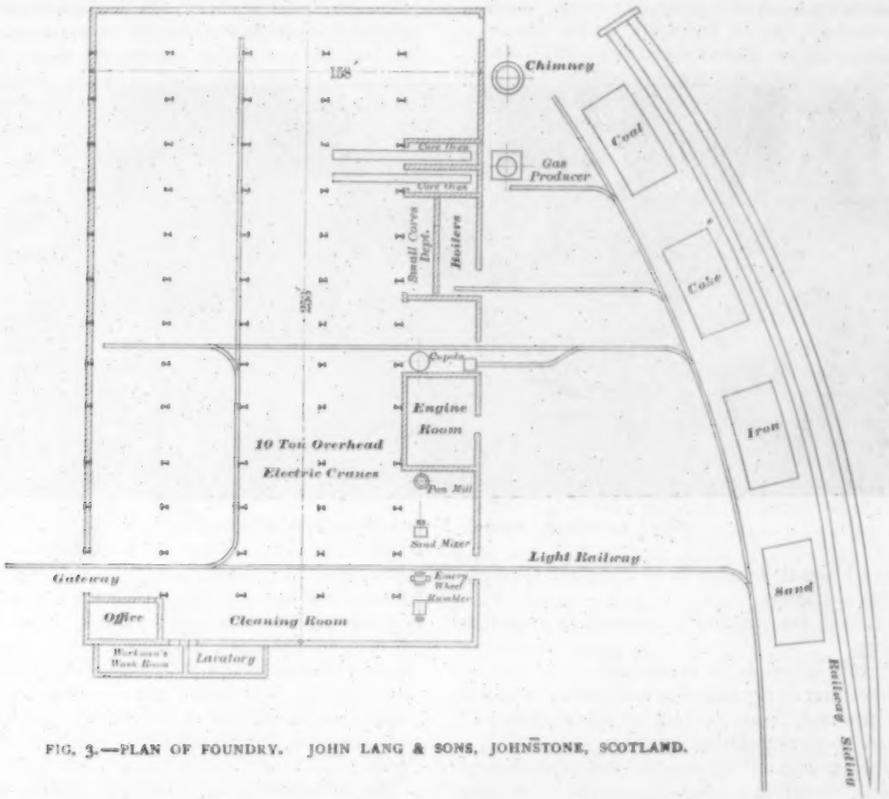


FIG. 3.—PLAN OF FOUNDRY. JOHN LANG & SONS, JOHNSTONE, SCOTLAND.

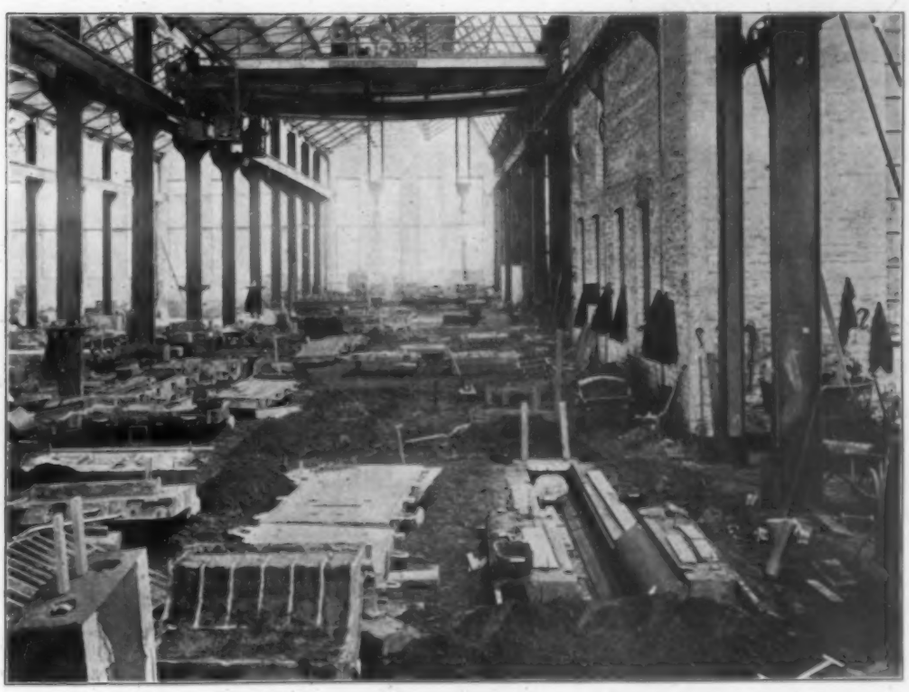


FIG 4.—VIEW OF BAY NEXT TO CUPOLA. JOHN LANG & SONS' FOUNDRY.

Be economical in the use of all supplies.

No workman other than the furnaceman allowed on charging platform.

Spare metal must not be poured out indiscriminately through the shop, but must be brought back to furnace, and poured out in places appointed for the purpose.

Smoking, unnecessary talking, reading, whistling, shouting, and profane language are strictly prohibited during working hours.

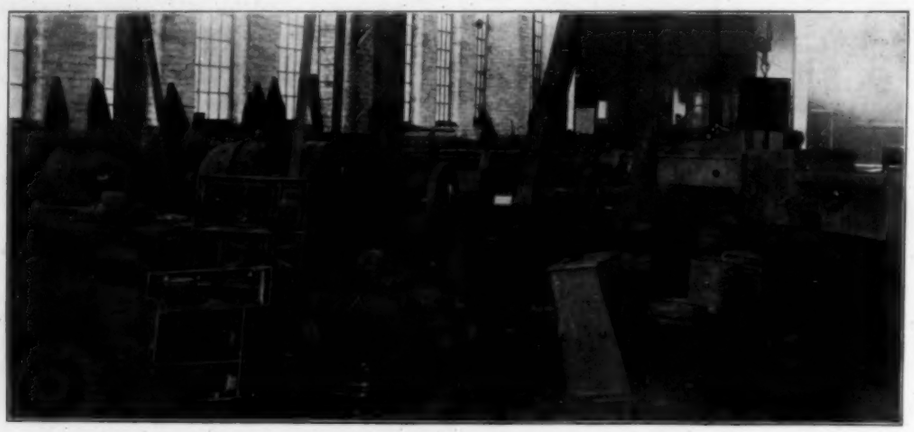


FIG. 5.—CHIPPING ROOM. JOHN LANG & SONS' FOUNDRY.

During the meal hours there must be no frolicking nor football playing inside the works.

Be neat and clean in personal matters as well as those pertaining to the shop.

See that every tool is kept in its proper place.

Should anything occur at any time that a workman considers a grievance, the firm will be glad to talk the matter over with him, and try to get matters amicably adjusted.

The above rules are part of the contract with every person in our employment, therefore no one can complain for being discharged for the non-observance of them.—[The Foundry. Data from C. C McMillan.

The Noble Brothers Machine Co. has awarded the contract for a machine shop, 50x200 feet, two stories high, to be erected at Fort Wayne, Ind. The firm makes a specialty of cooperage machinery, but other machines will be repaired and built. It is anticipated that the building will be completed, machinery installed and ready for operation by July 1.

The Chicago branch of the Federation of Labor has sent an invitation to Senator Hanna to visit Chicago and adjust matters in dispute between certain employers and employes. The troubles of some newspapers with their workmen and the affairs of the Allis-Chalmers Co. are mentioned in the invitation.

STEEL CORPORATION EXTENSIONS.

There has been further speculation in print in the past week concerning the plans of the United States Steel Corporation for the important extensions to be made in plants of subsidiary companies. The concentration of the operations of the National Tube Co. at some favorable point, is a matter that has been under consideration for some time. It has been officially denied that Conneaut is to be the scene of these operations. Some activity at Lorain, O., recently, particularly the decision made by the city council last week to appropriate $150,000 for widening and deepening Black river to the steel works site, has given rise to the report that the new works of the National Tube Co., including blast furnaces, steel works and pipe and tube mills, would be located at Lorain. This report has been circulated as though having official sanction, but as yet no official statement has been issued from New York.

An Associated Press dispatch from New York, under date of April 21, says that according to a statement from the offices of the United States Steel Corporation, the location of the tube plant has not yet been definitely decided, and that the choice of sites is between Lorain, O., and Neville Island in the Pittsburg district. It is also announced that the improvement program of the steel corporation includes an extensive modern plant at Economy, Pa., for the American Bridge Co.

FIG. 6.—FETTLING SHOP. JOHN LANG & SONS' FOUNDRY.

The Crown Machine Co., of Terre Haute, Ind., has been incorporated with a capital stock of $25,000 and will manufacture cotterpins and other hardware. The directors are: A. L. Pfau, Adolph Herz and William C. Doak, of Terre Haute, Ind., and Nathaniel Kirkpatrick and Michael Henry, of Dayton, O. The plant will be located at Terre Haute with a force of 30 men.

Chilled Cast Iron Car Wheels.*

BY C. H. VANNIER.

Chilled cast iron car wheels are distinctly an American product. In this country they are used under all freight cars and many passenger cars. According to the statistics giving the number of cars in service during the year 1901, there are in round numbers 12,000,000 cast iron car wheels in use under freight and passenger cars. In addition to this, cast iron wheels are used almost exclusively under cars running on street and interurban railways. The total tonnage of cast iron in use in the shape of car wheels now in service approximates 3,500,000 tons, or about one-quarter of the total output of pig iron in the United States in the past year. From these figures you will get an idea of the magnitude of this industry. It has become so important that it is a distinct branch of the foundry business, and to master it thoroughly requires study and experience covering a schooling of many years.

Chilled cast iron car wheels are made from worn-out wheels and new material in the shape of suitable pig iron. To get an idea of the method of manufacture, we will begin in the yard where the iron and old wheels are stored, and we will follow the raw material through the melting furnaces, into the foundry, through the inspection department and into the shipping room, where it appears as the finished wheel.

Selection of Pig Iron.

In the most progressive car wheel foundries the pig iron is bought under chemical specifications. When it is received at the foundry each carload is piled separate and marked with the car number, brand and grade. Samples are then taken consisting of 12 pigs representing the average of the carload, and these pigs are drilled and borings mixed, and the borings used for determining the analysis. The analysis of the pig iron consists in determining the silicon, manganese, phosphorus, sulphur and carbon. No analysis is made of old wheels as the average composition of old wheels is already well known. The old wheels before they are put into the melting furnace are broken up and graded according to the fracture and depth of chill. It should be known to the manufacturer what proportions of the different classes of material to mix to get proper mixture to give the results aimed at. This is a matter which can be determined very accurately, if the subject is properly understood.

It is important in selecting pig iron that the proper kinds be chosen. All kinds of pig iron will not answer, for the reason that the chilling property which the mixture must possess is governed by the chemical composition of the material used, especially as to the amount of silicon, manganese, carbon and sulphur.

The limits which must be adhered to in silicon are very narrow, a variation of one-fourth of one per cent being excessive; in fact, with a standard mixture the silicon should not vary between the minimum and maximum limits for an entire day's work more than one-tenth of one per cent, and it is the common practice in properly managed car wheel foundries to run for days at a time with the average silicon in the mixture not having a variation between the minimum and maximum of more than one-tenth of one per cent.

It is not as essential to keep the manganese within as narrow limits, still manganese plays a very important part in car wheel manufacture, and is used to a greater or less extent by many wheel makers. If used in the proper amount it adds materially to the strength of the wheels.

When the mixture of iron is made up as determined upon by calculation, it is sent to the charging room and thrown into the furnaces, together with coke as fuel. The furnaces generally used for melting car wheel mixtures are cupola furnaces, similar in many respects to those ordinarily used for melting iron for castings, but generally larger.

It is important in making good car wheels to use a good quality of coke. It is especially essential that coke low in sulphur be used, as high sulphur coke will harden iron. Some cupola furnaces used in car wheel manufacture have a melting capacity of 20 tons per hour, running continuously for eight or nine hours.

The melted iron as it comes from the cupola is collected in a large mixing ladle of from three to six tons capacity and from this mixing ladle the iron is poured into ladles having a capacity sufficient to pour one wheel with a little extra iron left over ,that is to say, a capacity of about 1,000 pounds of iron.

Method of Testing Cupola Metal.

The character of the metal as it leaves the cupola is judged from test pieces, which are poured from each tap from the cupola. These test pieces usually are 2x1½ inches in area and 6 inches long, and are cast with one side against an iron chill block, the other three sides of the molds being made of sand. These test pieces are left in the sand until they are dark red, which means about ten minutes after they are poured. They are then cooled in water and broken in two, so that the fresh fracture will show the depth of chill on test piece. Under ordinary conditions, the chill or depth of white iron, on the test piece, should not be less than 1 inch, nor over 1¼ inches. If the chill is much less than 1 inch there will not be sufficient chill on the wheels which the mixture represents, while if the chill on the test piece exceeds 1¼ inches to any great extent, there will under any ordinary circumstances be too much chill on the wheels.

Any material reduction in the percentage of silicon or manganese, or any material increase in the sulphur, will increase the depth of chill on the test piece; also, any material change in the total carbon in the mixture will have an influence on the depth of chill which the metal throws.

The weight of the standard car wheel used under freight cars is from 550 to 700 pounds, depending on the capacity of the cars, and the standard diameter of freight car wheels is 33 inches.

It is the usual practice for two men to prepare the molds and pour the iron for from 18 to 25 car wheels for a day's work, the molding being done in the forenoon and the pouring of the iron in the afternoon. There are many different systems of delivering the iron to the molding floors. Some foundries use overhead tracks with trolleys, others carry the iron on small trucks which run on floors with iron plates. Then again, there are foundries where the iron is carried in the ladles by cable, the molds being put up in rows.

Method of Chilling.

A mold for a chilled iron car wheel is made in part of sand and in part of iron. That part of the mold which forms the chilled tread and flange of the wheel is made of iron, while the balance of the mold is made of sand. If the tread and flange of the molds were made of sand also, there would be no chill on that part o fthe wheel which runs on the rail, because the principle of chilling depends on the rapid absorption of the heat contained in the melted iron, so that when it comes in contact with the iron part of the mold the metal sets almost instantly, and in this way prevents the carbon which is in solution in the melted iron from separating in the graphitic form, resulting in white hard metal. The balance of the wheel poured against the sand mold, on the contrary, cools slowly, giving the carbon an opportunity of separating in part as graphite, and this iron containing a large amount of graphitic carbon, is gray and can be bored, and is at the same time tough and elastic, while the metal forming the tread and which was chilled against the iron part of the mold is dense and very hard, possessing the necessary wearing qualities.

That part of the mold in which the car wheel is made which forms the tread and part of the flange, as already stated, is made of iron. For these iron chills, cast iron is used of good quality, as this part of the mold has to undergo constant expansion and contraction due to the pouring of the molten metal into the mold, followed by the cooling and shrinking away of the casting. The usual thickness of these castings is between three and four inches, the depth being governed by the width of the tread and flange of the wheel. The ordinary depth or height of these chill molds is four inches, making the section 4x3½ inches. In time chill molds become firecracked where the molten iron comes in contact with the mold, and sometimes the castings burst.

If the tread and flange of the wheel were not chilled, the wheel would give very little service, as the gray iron would wear hollow in a very short time. It must be borne in mind that cast iron car wheels are sold under a guarantee, either as

* A paper read before the students of Purdue University, Layfayette, Ind.

to a certain number of miles, or as to a certain number of years' service. It is, therefore, very important that the wheels shall have a proper chill on the tread and flange. It is customary to guarantee freight car wheels for from four to six years' service, and passenger wheels from 60,000 to 75,000 miles before they are worn out sufficiently to be removed. If the tread of the wheel were not chilled, it would probably not make 1,000 miles before it would be worn to such an extent that it would have to be removed.

Molding and Annealing.

It is very essential that the iron be poured into the molds as rapidly as possible. If this is not done, that part of the wheel forming the tread would be imperfect, containing wrinkles and flaws sufficient to warrant the railroad companies in rejecting the wheels. In properly operated wheel foundries wheels weighing 600 pounds are poured in not more than 15 seconds.

After the wheel has been poured, it is left in the sand about 20 minutes. By this time the metal has set in the entire casting. It is then picked up by means of crane tongs, and is conveyed to the annealing pits. These consist of iron cylinders lined with brick with a capacity sufficient to hold from 12 to 20 wheels. A number of these pits are grouped together, and the wheels are left in them from four to six days, so that they may cool slowly. If this were not done and the wheel was allowed to cool quickly, it would not possess any great degree of strength, for the reason that the chilled circumference being much denser than the metal forming the plates and hub would throw strains on the casting, and in this way weaken it, on the same principle that glass is brittle if cooled suddenly, while it is tough if cooling is done very gradually. The annealing process is one of great importance in the manufacture of car wheels.

After the wheels are taken out of the pits on, let us say, the fifth day after casting, they are passed through cleaning mills where sand blast is employed and the adhering sand in this way removed. They are then permitted to remain in the inspection room another day to cool when they are taken in hand by the chippers who remove whatever fins there may be on them, and who also remove the sand from between the plates, that is to say, the pan cores.

Measuring Shrinkage—Inspection.

The next process is to measure the circumference of each wheel, which is done by means of a steel tape. The object of this is to get at the amount of shrinkage which has taken place in the casting, as compared with the chill mold in which the casting was made. It must be borne in mind that the hardness of cast iron can be determined very closely by determining the shrinkage. There is no better way of determining the hardness of the metal in a car wheel, unless you break it up, than to get the shrinkage, of course, assuming that you know from experience what the shrinkage should be in a good car wheel. Under normal conditions, a 33-inch, 600-pound wheel cast in a standard mold with a chill mold 33½ inches in diameter, will give a wheel exactly 33 inches in diameter, that is to say, the wheel will have shrunk ½ inch in diameter, being that much smaller than the diameter of the chill mold in which it was made. We know from experience that shrinkage much in excess of this means a hard wheel, that is to say, too hard for safety and we also know that with a shrinkage much less than this we get soft wheels, that is to say, wheels with insufficient chill to warrant their shipment. It will, therefore, be seen that great importance attaches to the measuring of the shrinkage of wheels; in other words, of the taping.

To go on with the inspection: After the wheels have been taped, they are rolled over scales and weighed, at the same time a record being made of the molder who cast the wheel, also of the weight and shrinkage size, and any defects which may show themselves to the inspector who examines each wheel for defects as it passes over the scales. Such wheels as have too much or too little shrinkage are rejected by the inspector, while the good wheels are passed by him and put in stock, subject to result of tests.

Testing Finished Wheels.

From each day's work wheels are then selected for test. There are two methods of test in use, the one most commonly used is the drop test. For this test, the wheel is laid flange downward on a cast iron block with three supports in such a way that the hub of the wheel is clear from the block. A weight weighing 140 pounds is then allowed to fall 12 feet, striking the hub of the wheel centrally. Standard 33-inch wheels must stand from 10 to 12 blows under this test without breaking in two or more pieces. Ordinarily, wheels stand a much greater number of blows than this, 10 blows being the minimum under which wheels are accepted. After the test wheels are broken in this way, the depth of chill, which is white, hard iron, in the tread and flange is measured and record made of same. There are set limits for depth of chill. If the wheels have more chill than the maximum limit, the wheels of which the test wheel was representative are scrapped. The maximum limit permissible in the middle of the tread is one inch. The remainder of the iron in the body of the wheel must be gray and strong. If the chill on the test wheel on the other hand is less than one-fourth inch, the wheels of which the test wheel is representative are also scrapped because they have insufficient chill and would not give sufficient service.

In addition to the selection of test wheels from the shrinkage sizes, the test pieces are also consulted, and test wheels are selected from the cupola taps showing the highest chill on the test pieces, as well as wheels from highest shrinkage, so that the two guides used in selecting the test wheels are, on the one hand, the shrinkage size, and on the other, the test pieces taken from each cupola tap. The wheels are stamped when poured, so that the taps from which they came can be identified, and in this way there is no trouble in knowing where to locate a wheel as to which part of the heat it was poured from. In addition to the drop test referred to, there is another test called the thermal test which has come into use within the last five years, the object of this test being to determine on the ability of the wheel to stand expansion when the tread is heated by the brake shoe when the brakes are applied to stop the train or retard its speed. This thermal test consists in pouring a band of molten iron around the tread of the wheel to a depth of four inches, and varies in width from 1⅛ to 1½ inches. In this way the outside of the wheel is heated very rapidly, resulting in a sudden expansion strain being thrown on the wheel which sometimes results in a rupture, the cohesion of the particles of metal not being great enough to stand the expansion force produced by the sudden heating of the tread of the wheel. The specifications made by railroad companies as to what a wheel shall stand under the thermal test are not all alike, some roads requiring that the wheels shall not break through the tread inside of two minutes after the ring of molten metal is poured around the tread of the wheel, others providing for a smaller ring of metal and requiring the wheel not to crack at all through the tread.

History of Car Wheel Manufacture.

A short history of the cast iron wheel is not without interest. The first cast iron wheel of which I can find any record was made in the year 1800, and was used under small tram cars in Wales. These wheels were without flanges and were very similar in pattern to the ordinary wagon wheel. They ran on rails shaped like angle irons, the flanges being on the outside of the rails. They were made out of ordinary gray iron without any chill. It was not until nearly 50 years after this that they began making wheels with chilled treads and flanges. Among the first to make wheels of this character were Bush & Lobdell, of Wilmington, Del., and Whitney & Sons, of Philadelphia. You will find some very interesting exhibits of car wheels used under cars when railways were first introduced in this country, in the Field Museum at Chicago.

Great improvements have been made in the manufacture of cast iron car wheels since the middle of the last century. The greatest improvements, however, have been made within the last 15 years. The life of a cast iron car wheel measured in mileage has been doubled in the past 15 years, that is to say, the wheels which are turned out now are guaranteed for six years, while those turned out 15 or 20 years ago were guaranteed for not more than three years. In the same way in the mileage, we guarantee wheels today for 75,000 miles, while 40,000 miles was considered a high mileage guarantee 15 years ago.

Improvement in Quality.

The severity of the tests required today by railroads for cast

iron car wheels could not have been met 15 years ago. At that time five blows was usually specified for the drop test, and there was no such thing as a thermal test. Fifteen years ago the wheelmakers were almost without exception making their mixtures without the aid of chemistry, while today chemistry is one of the important factors in the manufacture of car wheels. In addition to this, much has been done in the last ten years in the way of scientific research, and also by taking advantage of physical tests to an extent which would hardly be credited by those not familiar with what is going on. As a result, the quality of the cast iron wheel has been greatly improved within the last few years, and this was necessary for the reason that the service required of car wheels at the present day is much more severe than it used to be, owing to the very great increase in the carrying capacity of cars. Twenty years ago a car of 40,000 pounds carrying capacity was considered something unusual, the ordinary capacity of cars being 28,000 to 30,000 pounds. Today a great many cars are being built with carrying capacity of from 80,000 to 100,000 pounds, and the speed of trains has also been very must increased in the past few years, as compared with the practice of 15 or 20 years ago.

The increase in capacity as between the 24,000-pound capacity cars on the one hand and the 100,000-pound capacity cars on the other hand amounts to 333⅓ per cent. The increase in the area of the axles at the wheel seat as compared between the axles used under 24,000-pound capacity cars and 100,000-pound capacity cars amounts to 175 per cent. The increase in the weight of rails used when 24,000-pound capacity cars were in service, as compared with the standard rail used today amounts to 100 per cent. The guarantee of wheels as between that given 15 years ago and that given today has increased 100 per cent, while the increase in the weight of wheels used under 24,000-pound capacity cars and those under 100,000-pound capacity cars has amounted to about 25 per cent.

Tendency Toward Heavier Wheels.

The number of wheels per car, which is eight, being the same under a 50-ton car as under a 12-ton car, and the increase in load being 333⅓ per cent, and the increase in guarantee being 100 per cent, there is a demand for increased efficiency in cast iron car wheels of 433⅓ per cent. If the added tare weight of the 50-ton car over the 12-ton car is considered, it can be reasonably estimated that there is a demand for a 500 per cent increase in the service of car wheels today over the service demand which existed not over 15 or 20 years ago. It is only natural for anyone to ask why the weights of the wheels have not been increased in proportion to the weights of the other equipment, such as rails and axles. One answer which I can make to this question is that the cast iron wheel has been giving such satisfactory service under the old style of equipment that it was thought that it was sufficiently strong to carry over twice, and sometimes three times, the load which it has been carrying. This, however, has been found to be wrong, and the tendency of the times is towards a heavier wheel for heavy capacity cars, and it looks very much as though a 700-pound, 33-inch wheel would be considered standard for cars of from 80,000 to 100,000-pounds carrying capacity.

Another reason why the railroads have been slow in sanctioning any material increase in the weight of standard car wheels is due to the fact that they do not see their way clear for an increase in the thickness of the flange of the wheel. This is due to the fact that the clearance left between the inside of the track rails and the guard rails, and also the clearance between the points of the frogs and the wing rails of the frogs are of such standard dimensions that any material increase in the thickness of the flange would not permit it to pass through between the guard rail and the track rail, and for this reason we do not see our way clear for any material thickening of the flange until the railroads change their standards for frogs and other special work in their tracks, so that a thicker flange than the present standard may pass through without striking an obstruction. The standard clearance between the inside of the rail and guard rail is 1¾ inches, while the mean thickness of the flange on the wheel is 1⅜ inches.

Severe Service Required.

The requirements which a car wheel has to meet in service today are such that every care must be taken to turn out the very best product. When it is borne in mind that the car wheel is the only part of the equipment of the railroad which is itself in motion, except the axle, and when we bear in mind that it is the wheel that transmits the load from the axle to the rail, and when we consider that the wheels at the same time that they are carrying the load are a good deal of the time in motion, sometimes making 500 revolutions a minute, while running over tracks which are not always in the best condition, and while striking frogs, crossings and switches, we get a fair idea of what is required of a car wheel. However, the car wheel has not only to carry the load at a high rate of speed, but it also furnishes the agency through the brakes for stopping the train. Few people realize the severity of the work required in stopping a train of heavily loaded cars when running at a speed of 40 miles an hour by means of the friction of the brakes on the wheels. This work generates an enormous amount of heat, which is absorbed by the wheels and results in their expansion. This expansion strain is so great as sometimes to cause a breakage of the wheel; consequently, the manufacturer must provide a sufficient factor of safety so that the wheels will stand this expansion strain without causing breakage. There is probably no other part of vehicles used in transportation that goes through the wear and tear required of a car wheel. They frequently carry a load approximating 15 tons per pair of wheels, and this load is a good deal of the time in rapid motion, and while the wheels are in rapid motion carrying this load the brakes are applied and the wheels heated at times to such an extent that the oil from the journal boxes will ignite on the surface of the wheel, and while in this condition they are sometimes required to pass through snowbanks, resulting in a sudden cooling and contraction, which is a very severe test of the tensile strength of the wheel. It will be seen that the car wheel must have a maximum amount of strength with a minimum amount of weight, and this has been the hard nut for the wheel maker to crack. How well we have succeeded is borne out by the fact that the consumption of cast iron wheels is continually on the increase, and at the same time the quality of the wheel is being improved from year to year.

In mounting wheels of the same nominal weights and diameters on axles, wheels of the same shrinkage size are chosen as pairs for the same axle, so that there may be no material difference in the diameter of the two wheels on the same axle. If this precaution were not taken, and if one wheel on an axle were smaller than the other, the smaller wheel would have to slip more or less on the track to keep up with the other wheel, and this slipping would cause the wheel to wear out sooner than it would if it were properly mated with the other wheel. Mismating of wheels also results in the wheels not running true with the track, which results in one of the wheels running against the flange, and soon making what is called a sharp flange or thin flange.

Standard railroad wheels are pressed on axles at a pressure ranging from 30 to 60 tons, the diameter of the bore where the wheel fits on the axle varying from 4 to 6⅞ inches, according to the size of the axle and the carrying capacity of the cars.

Claims for the Cast Iron Wheel.

Some of the reasons why the cast iron wheel is so popular are the following: In the first place, it is strong and gives a great deal of service. In the second place, it can be manufactured at short notice, and orders for cast iron wheels can be filled in an emergency in from a week to ten days after the receipt of the order. In the third place, cast iron wheels are cheap compared with other types of wheels. In the fourth place, the wornout cast iron wheel can always be disposed of at a profitable figure, the market for old wheels being as staple as the market for the best brands of pig iron; in fact, it frequently has occurred that old cast iron car wheels sell for a higher price than standard brands of pig iron.

The largest cast iron car wheel manufacturer is the Griffin Wheel Co., with headquarters at Chicago, and with foundries at Chicago, Detroit, St. Paul, Denver, Kansas City, Fort Madison and Tacoma. The output of finished car wheels during the year 1901 by this company amounted to 600,000 wheels. The Griffin Wheel Co. was organized in 1886 with a foundry located at Chicago, and with a capacity for 100 wheels a day, or 30,000 wheels per year. It is now turning out 2,500 wheels a day, melting 500 net tons of iron per day at Chicago plant, and 900 net tons a day at all plants.

The Iron Mountain and the Plant of the Mexican National Iron & Steel Co.*

BY T. F. WITHERBEE, DURANGO, MEX.

The Iron Mountain, situated three-quarters of a mile NE. of the limits of the City of Durango, rises abruptly from a level plain, and trends N. 83° E. Fig. 1 gives a view of the mountain, with the company's iron works. There are indications that the vein or deposit of iron ore extends also about two leagues across the *Morga* ranch, in the same general direction. The Iron Mountain proper is divided into two great lenses by a horse of *cantera* or eruptive rock, some hundreds of feet in width. The mass of solid ore is about 1 1-3 mile long by 1-3 of a mile wide, and from 200 to 400 feet high, the latter being the elevation of the cross. A conservative estimate of the amount of ore in sight, above the level of the plain, after making due allowance for the horse, is 360,000,000 tons, as shown by re-survey and measurements made during the last six months.

The ore is specular hematite, martite, or magnetite, according to locality. It is generally hard, or massive, although at the western end, at the cave, where the only mining has been done, it comes out as fine powder, or the lumps disintegrate into powder upon exposure. This powdery ore is used as "fix" in the puddling furnaces, because of its low silica. Physically the ore is one of the hardest and strongest rocks. It is very severe on the wearing parts of crushers, and will cut into the face of a steel hammer, regardless of its temper.

THE IRON MOUNTAIN, DURANGO, MEXICO, AND WORKS OF THE MEXICAN NATIONAL IRON & STEEL CO

A curious fact noted by all who have examined the deposit is that while the massive ore and the crystals yet retain their sharp and perfect edges, lumps of iron ore in the *talus* or *debris* which surrounds the solid formation on all sides are rounded or nodular—the reason of which is not clear. These nodules are imbedded in a stiff clayey matrix which holds them quite firmly, so that mining with pick and shovel is sometimes profitably aided by explosives.

Practically all the solid ore is covered by 121 *pertenencias;* 118 owned by the Mexican National Iron & Steel Co., and 3 by the Flores estate. Iron denouncements have been made outside of these limits; but they are of little importance, as the layer containing the rounded lumps is only from 2 to 4 feet thick, and is rapidly exhausted.

As shown by the analyses given in the appendix, the ore is very high in metallic iron, while the phosphorus runs from as low as 0.035 to more than 1 per cent. In some places the massive ore is decidedly columnar, like basalt; and there is some evidence of its having been in a state of fusion—for instance, outlying patches of ore, from 2 to 3 feet in thickness, evidently broken up in place, and assuming a rounded form; also, large lumps of what appears to be solid iron ore, which, upon breaking, prove to be only pieces of *cantera,* covered with a superficial coating of iron oxide, often highly crystalline, and only from 0.25 to 0.5 inch thick, as though the rock had been immersed in molten iron oxide. Crystals are most numerous, and more perfect, next to the eruptive rock.

Considerable prospecting has been done on the mountain for gold and silver, and traces of the latter are often found. At one place on the *Morga* ranch, in a ledge of solid iron ore, as much as 9 ounces of silver and 0.5 ounce of gold per ton has been found. For more than 50 years this ore has been used in a cold-blast charcoal furnace some 7 miles away, owned by the Flores estate, and since 1888 it has been used in the furnace of the Mexican National Iron & Steel Co. Its use as a flux by the lead smelters at Monterey, Aguascalientes, Velardeña, Mapimi, and other localities within reach, dates from 1893, and amounts to over 400,000 tons. Iron made from the ore with charcoal has exceptionally good chilling qualities, which render it specially desirable for the wearing parts of rolls, crushers, grinding-pans, quartz-mills, etc. Even the "straight" white iron is very strong, and, in the foundry, retains its fluidity like gray iron. When coke is used in the blast furnace, a fine quality of foundry iron, of great strength, is the result. Above 2.75 per cent silicon the iron becomes closer in grain as the silicon increases; but its softness and fluidity are retained. The following system of grading pig iron is used, and has proved satisfactory when attention is paid to it, and the user knows what he needs:

Grade.	Silicon, per cent.
Mill iron	Up to 1.25
No. 3 Foundry	1.26 " 1.50
No. 2 "	1.51 " 1.75
No. 1 "	1.76 " 2.00
No. 1X "	2.01 " 2.25
No. 3 High silicon	2.26 " 2.50
No. 2 " "	2.51 " 2.75
No. 1 " "	2.76 " 3.00
No. 1 " "	3.01 and over.

Sulphur runs below 0.05 per cent, and phosphorus from 0.40 to 0.65 per cent. It will be noticed that the foundry and high-silicon brands differ by exactly 1 per cent of silicon for corresponding grades.* The blast furnace is at the base of the western end of the mountain, and is underlaid by the stratum of nodular or loose ore covered to a considerable depth by the clayey matrix.

The ore is hauled up an inclined plane, 180 feet long, to a 10 by 16 Blake crusher, from which it is automatically discharged into two 7 by 10 crushers; and thence, broken to about chestnut size, as a maximum, with considerable fine ore, it falls to the stock-house floor. It is charged into the furnace

* Prepared for the Mexican meeting of the American Institute of Mining Engineers.

* In order to show the fallacy of grading pig iron by grain, two samples are shown at the meeting, one containing 4.32 and the other 0.75 per cent of silicon. The average foundryman might not take either to be a "scrap-carrier," or, if he did, would surely choose the wrong one. Other samples of iron ore, pig and bar iron, the latter bent cold, were exhibited to show the excellent quality of the products of this plant.

by the old way, in barrows. The stack has the following dimensions:

	Feet.
Height	65
Diameter of bosh	9
Diameter of crucible	5
Diameter at stock line	6
Diameter of bell	4
Diameter of tuyeres	4 in.

No. of tuyeres, 4.

Blast is supplied by a vertical direct-acting Tod engine with steam-cylinder of 38 inches diameter and 48 inches stroke, and air-cylinder of 84 inches diameter and 48 inches stroke. Steam is supplied by four return tubular boilers 66 inches in diameter by 18 feet long, and one 125-h. p. Heine boiler. Usually three tubulars supply sufficient steam for the blowing engine, crusher plant, machine shop, blacksmith shop, and electric light plant. The blast is heated by one 40-pipe Cochrane stove, practically the same as the Cowper. As about 5,500 cubic feet of air pass through said stove per minute, the temperature is very low, seldom reaching 400° F.

The fuel used is charcoal, or a mixture of charcoal and coke; the latter from Sabinas or Barroteran, in the State of Coahuila, Mexico. On charcoal alone, the blast pressure is very high, from 6 to 12 pounds; but a mixture of one-quarter of Barroteran coke reduces it to 5 pounds or less. The use of coke affords also a ready and sure means of controlling the silicon in the pig iron.

The present furnace stack itself is hardly up to date, being built of cut stone, some 35 feet in diameter at the bottom by 55 feet high (topped out with 10 feet of iron shell), with deep, low and narrow arches, rendering it impossible to work in them just when work has to be done there. The bosh is covered by a wrought-iron jacket, supplied with vertical cooling pipes, which, by the way, are of little use in preserving the bosh. The tuyere section is protected by water-cooled cast iron plates, and water-cooled square or rectangular tuyere coolers. Iron coolers are used by preference, while the intermediate and blowing tuyeres are of bronze. The Lürmann closed cinder-front is used in two arches. The combination charcoal and coke furnace, which will soon replace the present one, will be from 65 to 75 feet high, and capable of being lined to 16 feet diameter of bosh. Much of the material for the new stack is now on hand. Two C. H. Foote firebrick stoves will be erected, 65 feet high by 18 feet in diameter, with a combined heating surface of 52,000 square feet.

The natural fuel for this locality is charcoal, which can be laid down at the furnace for less cost per ton than coke in Chicago. Limestone, both *Caliche* and crystalline, of good quality, is found anywhere from 25 miles out on the line of the Mexican International Railroad.

The greater part of the product of the present furnace goes to the rolling-mill, about 250 feet west of the furnace. This mill contains 5 double puddling furnaces, a Siemens regenerative heating furnace and gas producers; a combination 18-inch muck and bar train, a 10-inch finishing train, with the necessary complement of shears, crusher, grinding pan, squeezer and roll-lathe. The 10-inch train turns out rounds from ¾ to 2 inches; squares from ⅜ to 2 inches, and flats from ¼ by ¾ up to 4 by 1¼. The 18-inch bar-mill has a capacity for rounds up to 6 inches, and for flats up to 8 inches.

The foundry is at present only 80 by 65 feet in size, but will soon include the space now occupied by the machine shop, which will make it 190 by 65 feet. It has one 48 and one 24-inch cupola, and the weight of the castings made is only limited by the crane capacity. The present machine shop is 110 by 65 feet in size; but a new one is to be built, measuring 250 by 65 feet, and supplied with regular and special tools for the manufacture of all kinds of mining and milling machinery. The present tool equipment includes a planer 48 inches by 48 inches by 16 feet, and a lathe to turn pieces up to 10 feet in diameter. The blacksmith shop has eight fires and one heating furnace, with a steam hammer capable of forging shafts up to 7 inches diameter. A 4,000-pound steam hammer will be added to the new shop.

The manufacture of Hooper pneumatic concentrators is now under way, and special tools will be provided to turn them out rapidly and cheaply. A Hooper testing plant is now in operation, in which ores are tested for concentration by that system.

An interesting feature connected with this plant is the fact that, excepting heads of departments, all the labor, skilled and unskilled, is Mexican throughout. Molders, machinists and blacksmiths are satisfactory, as is also the blast furnace labor, including night and day foremen. In the rolling mill astonishingly good results have been obtained with such labor, after a very short time of training. The average experience of the puddlers, puddlers' helpers, roughers, rollers, heaters and gas makers at the rolling mill does not exceed one year. The number of puddling furnaces will be doubled as soon as sufficient labor can be educated, making the puddling department equal to the rolling capacity.

APPENDIX.

Analyses of Iron Ore of the Iron Mountain, Durango.

	1	2	3	4	5	6	7
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
SiO_2	5.58	6.12	10.80	5.04	3.74	3.18	7.02
TiO_2	.....	.....	.....	.....	.....	.....	.....
Al_2O_3	1.93	1.73	0.65	0.69	0.93	0.18	2.06
CaO	2.80	3.80	1.25	0.20	0.50	0.80	1.15
MgO	0.36	0.34	0.41	0.09	0.17	0.23	0.22
SO_3	.....	.....	.....	.....	.....	.....	.....
S	0.35	0.019	0.017	0.026	0.019	0.033	0.024
P_2O_5	.....	.....	.....	.....	.....	.....	.....
P	0.785	0.369	0.316	0.210	0.309	0.199	0.275
Fe_2O_3	.....	.....	.....	.....	.....	.....	.....
Fe	60.48	.....	59.95	65.55	65.15	65.95	60.85
Mn	0.30	0.29	0.32	.....	0.13	0.30	0.26
Loss on ign.	1.06	0.80	0.16	0.44	0.84	0.80	2.08

Analysis 1. is a general average, made for our own use. The rest are from the Report of Robert W. Hunt, dated March 28, 1901, and represent different parts of the property, as follows: 1. Mass in place, on N. boundary; 2. The "cave"; 3. Drift on E. face of property; 4. Boulders in place on Ridgely peak; 5. The Cross (a monument erected on the summit farthest to the right in Fig. 1); 6. Western face of property; 7. Stock-pile at furnace.

Analyses of Sabinas Coke.

	Per cent
Moisture	0.11
Volatile combustible	2.32
Fixed carbon	79.00
Ash	18.57
	100.00

Analyses of Ash from Sabinas Coke

	Per cent of Coke	Per cent of Ash
Silica	9.98	53.52
Alumina	5.33	28.61
Ferric oxide	1.44	7.71
Metallic iron	0.71	3.81
Lime	0.72	3.89
Magnesia	0.31	1.61
Sulphur	0.15	.83
Phosphorus	0.003	.0137
	18.643	100.037

Analyses of Barroteran Coke, Unwashed.
(Iron Mountain Co.'s Analysis.)

	Per cent
Moisture	0.12
Volatile combustible	0.22
Sulphur	0.55
Fixed carbon	82.36
Ash	16.75

Physical Tests of Bar Iron from Samples taken at Random from Stock.
(R. W. Hunt's Report of March 28, 1901.)

Size	0.5 in. round	1 in. round	0.5 in. sq.	1 by 0.25 in.	2 by 0.625 in	3 by 0.75 in
Tensile strength per sq. inch, lbs	50,610	48,420	51,860	54,060	49,500	49,020
Per cent of elongation in 8 in	22.5	30	25	19.5	21.75	20.25
Per cent of Reduction in acres	30.75	43.8	40.36	27.4	29.4	25.25

Character of fracture fibrous in all five cases.

In the Federal Court at Indianapolis last week Judge Baker denied the application of the Rockwood Mfg. Co. for an injunction against interference on the part of the striking molders with the employes of the works. It was held that the court lacked jurisdiction unless it could be shown that the company's property had been damaged to the extent of $2,000, or that it was probable it would be damaged in that amount. Judge Baker held that it had not been shown that the strikers had interfered with or intimidated the Rockwood employes. He said it was evident the peace officers of the state had poorly performed their duty, but that the complainant had signally failed to show by evidence that any of its employes had been prevented from working in its factory. Judge Baker stated he would hold the bill of complaint on the docket in order that if any overt act of the strikers should bring them within the court's jurisdiction an injunction could be issued.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of their Wants:—

Morton & Co., of York, Pa., have interested a number of Eastern capitalists in their company and a stock corporation will shortly be the result with a capital of $100,000. The new company will manufacture gasoline traction engines on a large scale. The present plant and site of 15 acres will be purchased and a number of buildings will be added.

The Mechanical Locomotive Stoker Co. is being organized at Franklin, Pa., with a capitalization of $1,000,000, for the purpose of erecting a plant for the manufacture of locomotive stokers. Gen. Charles Miller will be chairman of the executive committee; C. J. S. Miller, president; S. J. Myer, vice president; George C. Miller, secretary, and O. D. Bleakley, treasurer.

The Mineral Range Iron & Mining Co. has been incorporated at Toronto, Ont., with $500,000 capital. F. A. Hunt, Emil Landsberg, H. J. Bingham, M. C. Hall and H. C. Farnum.

The Zanesville Malleable Iron Co., of Zanesville, O., has been incorporated with $50,000 capital by R. H. Frees, J. D. Buman, S. H. England, M. M. Granger and S. M. Granger.

At a meeting of the stockholders of the Marinette Iron Works Manufacturing Co., Marinette, Wis., held last week, it was decided to increase the capital stock from $200,000 to $500,000. R. H. Trumbull, of Chicago, resigned from the board of directors and his vacancy was filled by the election of A. C. Trumbull.

Standard Diamond Drill Co., Chicago, has been incorporated with a capital stock of $50,000, to manufacture drills and machinery. The incorporators are Byron B. Carter, Charles S. Bartholf and E. B. Stephens.

The Tway Steel & Forge Machine Co., of Camden, N. J., has been incorporated with $100,000 capital and will operate a plant at Camden for the manufacture of forging machinery. The main building will be 70x200 feet. Arthur Bruce, J. J. Wood and Edward Bodin are the incorporators.

The Columbus Elevator & Iron Co., of Columbus, O., has been incorporated with $10,000 capital for the purpose of establishing a plant for the manufacture of elevators and elevating machinery. J. L. Simpson, E. J. Simpson, J. E. Spencer, F. S. Bartlett and W. V. Moler are the incorporators.

The Sharon Brass Mfg. Co., of Sharon, Pa., has been incorporated with $30,000 capital for the purpose of operating a brass foundry. S. C. Koonce, J. S. Leslie, J. L. Merritt, M. O. S. Chrock, R. A. Wilson and T. L. Woodward are the incorporators.

The Standard Metal Mfg. Co. was granted a New Jersey charter last week with a capitalization of $100,000. It is reported that this will be a combination of some of the leading hardware manufacturers of the country to offset the recent hardware consolidation.

The capital stock of the Alabama Iron & Tube Co., Nashville, Tenn., has been increased from $150,000 to $200,000. The company recently purchased the Helena Rolling Mill which has been converted into a wrought pipe plant.

The Illinois Iron & Bolt Co., of Carpentersville, Ill. has been incorporated with $280,000 capital. The company will manufacture tools and machinery.

The Crown Machine Works, of Terre Haute, Ind., has been incorporated with $25,000 capital for the purpose of manufacturing light hardware. The incorporators are A. Herz, William C. Doak, A. L. Pfau, N. W. Kirkpatrick and Michael Henry.

The Buffalo Excelsior Machine Co., of Buffalo, N. Y., has been incorporated with $250,000 capital for the purpose of manufacturing metal ball bearings. David Jameson, A. N. McNabb and James Kerr are the incorporators.

The Taylor & Wilson Co., of New York, has been incorporated with $10,000 capital to manufacture tools and machinery. J. H. Taylor, C. F. Wilson and H. Wilson, all of New York, are the incorporators.

The Marietta Sheet & Tin Plate Co., Marietta, O., has awarded the contract for the erection of its sheet mills to the Wheeling Mold & Foundry Co., Wheeling, W. Va. The contract calls for four hot and the same number of cold mills and six shears. At a meeting of the company held at Marietta last week officers were elected as follows: J. M. Ickes, president; L. C. Taylor, secretary; R. Park, treasurer; D. Lewis, superintendent, and E. E. Erikson, of Pittsburg, will be the engineer.

The New York Nut Co., of New York, has been incorporated with $50,000 capital. A. T. Harlow, L. W. Harlow and M. Bishop are the incorporators.

The Frank Machinery Co., of Albany, N. Y., has increased its capital stock from $10,000 to $25,000.

The Worcester Steel Foundry Co., of Worcester, Mass., has been incorporated with $100,000 capital to manufacture a steel cast rail bond. George C. Whitney has been elected president, and William H. Cook, treasurer.

The National Steel Casting Co., of Montpelier, Ind., and the Lima Steel Casting Co., of Lima, O., whose plant was damaged by fire several months ago, have consolidated under the name of the National Steel Casting Co. D. E. Harlan, manager of the Lima plant, has been elected treasurer and manager of the consolidated companies. By the consolidation much work on the books of the Lima concern when the fire occurred will be carried out. The entire equipment of the Lima plant not destroyed by the fire was removed to Montpelier. G. Max Huffman is president of the consolidated companies, and James O'Donnell, vice president, and F. E. W. Scheiman, secretary.

The American Steel Construction Co., of New York, has been incorporated with $100,000 capital for the purpose of manufacturing engines, locomotives, cars, trucks, etc. F. L. Dutton is president and E. F. Whittum is treasurer.

The Allied Securities Co., of New York, has been incorporated in New Jersey with $2,000,000 capital, which will later be increased to $25,000,000 for the purpose of acquiring woven wire manufacturing concerns throughout the country. A controlling interest has already been secured in the Page Woven Wire Fence Co., which is capitalized at $8,000,000. According to the circular already mailed to the stockholders it is proposed to exchange Allied Securities Co. stock at par for the securities of the Page Woven Wire Fence Co. as follows: Bonds, $950 for $1,000; preferred stock, $95 per share and $10 for common stock.

The Ohio-McCloskey Wire Fence Co., of Toledo, O., has been incorporated with $100,000 capital for the purpose of manufacturing wire fencing. George U. Roulet, John Stollberg, H. H. Hunter, Richard Kind, J. P. Degan and J. P. Daley are the incorporators.

The Link-Belt Machinery Co., Chicago, has increased its capital stock from $600,000 to $630,000.

The Western Tool Works, Chicago, has been incorporated with a capital stock of $15,000. The incorporators are J. Herbert Jann, Edmund S. Carr and E. A. Biggs.

The American Car & Foundry Co., St. Charles, Mo., is building a blacksmith shop, 80x140 feet, in which will be located 25 fires, two new hammers and other machinery for heavy forging work.

John Davis, 81 Haverhill street, Boston, Mass., is in the market for a second-hand belted air compressor, 16 or 18-inch cylinder; 300-horsepower, second-hand slide valve engine, and 250-horsepower engine, 14 to 18 feet diameter, 28 to 35-inch face, 10 to 12-inch bore.

Spruks Mfg. Co., Washington, N. C., is in the market for complete equipment for machine shop, foundry and blacksmith shop.

Battery Machine Co., Rome, Ga., is in the market for six boilers, ranging from 16 to 30 horsepower, and engines ranging from 16 to 20 horsepower.

In view of the fact that the stock of the Detroit Iron & Steel Co., which is to build a blast furnace on Zug Island, below Detroit, was over subscribed by $400,000, there is a proposition to build an open-hearth plant adjoining. Charles W. Baird and Andrew H. Green, Jr., manager of the Solvay Process Co. at Detroit, are prominently connected with the project.

The charcoal furnace which the Cleveland-Cliffs Iron Co. is building at Presque Isle, near Marquette, Mich., is being pushed forward. It will probably be in operation by Jan. 1, 1903. The boiler house will be 60x175 feet, containing 20 boilers; the chemical works, 90x150 feet, and the pumping station, 50x125 feet. An output of 200 tons a day is expected.

The Missouri, Kansas & Texas Railway will build new shops at Smithville, Tex., 250x260 feet, and install new machinery.

Mt. Marion Coal Mining Co., Strawn, Tex., wants to purchase 150-horsepower engine, two 80-horsepower boilers, hoisting machinery, shaft fixtures and equipment.

The McKercher Wrench & Tool Co., Jackson, Mich., which was recently incorporated with a capital stock of $30,000, is in the market for machine tools and equipment for its new plant. The officers of the company are: President, Robert Lake; vice president, H. S. Griggs; secretary, H. U. Ulrickson; treasurer, George Hastings; superintendent, George McKercher.

Baltimore Rolling Mill Co., Baltimore, Md., has been incorporated with a capital stock of $200,000. The company will build a 10-inch and an 18-inch train which will have an annual output of 20,000 to 25,000 tons. Henry Wehr is president, and Charles G. Phillips, formerly with the Diamond State Steel Co., Wilmington, Del., vice president and treasurer.

J. Ogden Armour, Chicago, has given the Armour Institute, Chicago, $25,000 to purchase machinery and electrical appliances for the new machinery hall.

W. H. Michael, formerly connected with the M. & O. shops at Murphysboro, Ill., is the head of the Southern Illinois Foundry & Machine Co., which is establishing a plant at that point.

The Alliance Machine Co. is making satisfactory progress on its new plant at Alliance, O., a portion of which will be in operation within the coming month. The product will be electric traveling cranes, engineering equipment and special machinery. Ultimately a foundry will be erected, but at the outset castings will be let on contract. The company has made considerable purchases of machinery, including a number of heavy tools from the Niles-Bement-Pond Co. Wilbur C. Whitehead, of Cleveland, is president of the company, and W. H. Purcell, for a number of years connected with the Morgan Engineering Co., of Alliance, general manager. The directors include Judge Stevenson Burke, W. C. Whitehead, W. H. Purcell, G. W. Shem, W. J. Finnerty, W. S. Milbourn and Norton T. Horr. The company is capitalized at $200,000.

The Guardian Trust Co., of Cleveland, receiver, announces that in accordance with the wishes of the creditors of the Danielson Machine & Tool Co., a sale has been made to W. N. Crafts of all the assets of the company, excepting cash and accounts and bills receivable, for the sum of $15,900. Mr. Crafts was an officer of the Danielson Machine & Tool Co.

The contract for the Machinery Building has been awarded by the Louisiana Purchase Exposition Co., at a public letting, to Smith & Eastman, a general contracting concern, for $496,957. The Machinery Building is one of the largest of the exhibit group, its dimensions being 525x1,000 feet.

Fires and Accidents:—

The Bruner foundry, at Peru, Ind., was destroyed by fire last week; loss $10,000.

The mounting and pattern departments of the Globe Steel Range Works, Kokomo, Ind., were desroyed by fire last week, entailing a loss of $20,000.

The plants of the Columbus Iron Works and the Southern Plow Co., Columbus, Ga., were desroyed by fire last week. The loss is estimated at $100,000.

The engine room and pickling department of the Monongahela works of the American Tin Plate Co., Pittsburg, were damaged by fire to the extent of $5,000 last week.

Fire destroyed the hoisting apparatus at the blast furnace of the Sharon Steel Co., Sharon, Pa., last week.

The Woodhouse Chain Co.'s plant, Trenton, N. J., suffered a loss of $50,000 by fire last week.

New Construction:—

At Grand Haven, Mich., a new brass foundry is being built 360 feet long and 85 feet wide.

J. H. McKenney, Joplin, Mo., has had plans prepared for a foundry and machine shop to cost $5,000.

Cream City Woven Wire Works, Milwaukee, Wis., is having plans prepared for a four-story plant to be erected at Thirty-first street and Fond du Lac avenue.

The Monarch Iron & Steel Co., Parkersburg, W. Va., has begun the erection of a plant for the manufacture of planished iron sheets under the patents of G. C. Broomall, of Parkersburg. The company was recently incorporated with a capital stock of $100,000. S. M. Nease, of Pittsburg, Pa., is president; E. M. Whitte, Pittsburg, secretary; G. Broomall, Parkersburg, treasurer, and J. R. Rose, of Parkersburg, general manager.

The United States Wind Engine & Pump Co., Batavia, Ill., will build a foundry 65x290 feet.

Work on the erection of the new muck mill of the Ohio Falls Iron Co., New Albany, Ind., is progressing. The main building, which will be 300x180 feet, will be under construction shortly. The foundations for the muck mill have already been completed. It has also been decided to erect a mill building 300 feet long and 120 feet wide for the purpose of installing an 8 and a 10-inch mill.

Joseph F. Rothe, now operating a foundry and machine shop at Green Bay, Wis., has decided to erect an entirely new plant which will have a daily output of twice the present plant.

The Modern Steel Structural Co., Waukesha, Wis., will erect a structural fitting shop 160x160 feet.

The Chisholm & Moore Mfg. Co., Cleveland, will build an addition to its foundry. The new building will be one story high, 100x63 feet, and will cost $3,500.

The Franklin Steel Co., of Boston, has decided to remove its plant to Chicago Heights, Ill. Plans are now being prepared for the erection of two buildings that will cover 225x270 feet of ground. The company manufactures horse shoes and toe calk steel, and will erect a rolling mill for rolling billets into bars.

The Alabama Consolidated Coal & Iron Co., Birmingham, Ala., will entirely rebuild its Gadsden, Ala., furnace during the summer.

The Globe Foundry & Machine Co., Johnstown, Pa., will erect a large addition to its pattern shop.

The Alamo Mfg. Co., Hillsdale, Mich., will erect a new foundry 40x80 feet.

The Midvale Steel Co., Philadelphia, Pa., will erect an addition to its forging shop 256x176 feet.

The Noble Bros.' Machine Co., Fort Wayne, Ind., will erect a new machine shop, two stories high, 200 feet long and 50 feet wide.

The Cumberland Cement & Mfg. Co. will erect a large cement manufacturing plant at Riverside, Mineral Ridge county, W. Va. When the plant is placed in full operation about 600 tons of rock will be consumed daily.

At a meeting of the stockholders of the Youngstown Mfg. Co., Youngstown, O., to be held on May 10, the proposition of erecting an open-hearth plant will be considered. It is also probable that a plant for manufacturing builders' hardware will be added. The capital stock of the company will also be increased to provide for the extensive improvements outlined.

M. R. Johnson & Co., Madison, Wis., is erecting a new machine shop 65x100 feet to its gasoline engine plant.

The Variety Iron Works Co., Seattle, Wash., has commenced the erection of its new foundry. The main building will be 80x100 feet, with a wing 20x30 feet.

The Standard Screw Works, of Worcester, Mass., which owns and operates the Detroit Screw Works, Detroit, Mich., is having plans prepared for an extensive addition to the Detroit plant. This addition will be only temporary. A larger and more substantial addition will be built, which will include a rod mill and merchant mill for rolling the steel used in this plant.

Plans have been prepared for the new plant of the Ball Engine Co., of Erie, Pa. The machine shop will be 136x200 feet with a power building 60x80 feet. The erecting shop will be 76x200 feet, 44 feet 2 inches to the lower chord of the roof truss, and will have a 30-ton traveling crane. There will be two buildings at the sides, each 60 feet wide. These extensions will have a saw-tooth roof and will be equipped with five-ton cranes arranged to run at right angles to the crane of will be removed from Philadelphia to East Norwood, a suburb of Marietta; also that a large tract of land is under option to parties who propose to build a steel plant.

The Pittsburg District:—

The Pittsburg Tool Steel Wire Co., of Pittsburg, has been organized for the manufacture of drill rods and wire for use in making awls, screw drivers, nail sets, cork screws, steel balls and anything requiring a high grade material. The plant

will be built at Monaca, Pa., near the plant of the Colonial Steel Co., which will furnish the steel. Werner Kaufmann, of the firm of Kaufmann & Stengel, steel merchants, Philadelphia, has been elected president; F. C. Eaton, who was superintendent of the drill rod and wire departments of the Crescent Steel Co., of the Crucible Steel Co. of America, and who has had extensive experience in this line, has been elected vice president and general manager, and G. Stengel, Jr., secretary and treasurer. The main building will be built of brick, 150 feet long and 50 feet wide; there will also be an iron clad building, 75x75 feet. The plant is to be placed in operation about July 1. Offices have been opened in the House building.

The Metallurgical Laboratory, 545 Liberty avenue, Pittsburg, has recently added a foundry department and is prepared to make analyses for foundry purposes on an extensive scale. Geo. P. Maury is manager.

The Vulcan Crucible Steel Co., of Pittsburg, will add a rolling mill and open-hearth plant to its works at Aliquippa, Pa.

Suit was commenced against the Pressed Steel Car Co. last week by several of its stockholders to prevent the purchase of the McCord Bros.' plant at Hegewisch, Ill. According to the terms upon which the plant was to be purchased the owners of the McCord plant were to pay to the car company $200,000 and were to receive $450,000 in stock. It is alleged in the bill that owing to bad management the Pressed Steel Car Co. was compelled to place a mortgage on its property in 1891 for $5,000,000, and that the obligation to pay $500,000 on this mortgage does not place the company in position to buy additional properties.

The Osborne-Saeger coal interests of Cleveland, O., have opened offices of their new company, known as the Youghiogheny & Ohio Coal Co., in the People's Bank Building. Charles Porter, formerly superintendent of the Pittsburg Coal Co., has been appointed general agent of the company's interests in the Pittsburg district.

At a meeting of the board of directors of the A. Garrison Foundry Co., South Side, held recently to consider an increase in the capitalization, it was decided to postpone action until early in May. Plans have already been prepared for extensive additions to the company's plant.

Phillips, Nimick & Co.'s mill site on the South Side, has been purchased by the Pennsylvania railroad company to provide for extensions in its trackage. The cost of the property was $300,000. The buildings and their equipment are to be removed to a new location and it is probable that the mill will be removed from Pittsburg, both West Newton and Connellsville making propositions for the location of the plant within their respective confines.

The Standard Underground Cable Co., Pittsburg, Pa., has broken ground at Perth Amboy, N. J., for the erection of a $500,000 copper wire drawing plant. It is the intention to produce 200,000 pounds of copper rods daily which will be drawn at both the Perth Amboy and Pittsburg plants.

Thomas Lynch, president of the Frick Coke Co., accompanied by E. J. Buffington, president of the Illinois Steel Co., O. W. Kennedy and W. G. Wilkins, returned from a trip last week to the new Pocohontas coal field in West Virginia. Locations were made for eight mines and the coking plants, which will include about 1,200 ovens. Work on the erection of the ovens will be commenced immediately and it is probable that the production of coke can be commenced with by January, 1903. The daily output will amount to about 3,000 tons. The larger portion of this output will be consumed by the furnaces of the Illinois Steel Co.

George L. Fisher, of the Fisher Foundry & Machine Co., Pittsburg, has closed a deal for the purchase of 100 acres of land at Connellsville, Pa., for $125,000. A large foundry and machine shop is to be erected on this property.

William Swindell & Bros., Pittsburg, have been awarded the contract for the erection of four 25-ton open-hearth furnaces for the Sharon Steel Hoop Co., Sharon, Pa.

Jones & Laughlins, Ltd., have not abandoned the manufacture of rods as has been reported. The engine operating the rod mill was found to be of insufficient capacity, and pending the erection of a larger engine, merchant shapes will be rolled, several tables being disconnected. As soon as the new engine is in place orders will again be taken for rods as heretofore. At present the company is adding two 25-ton acid open-hearth furnaces to its Soho plant, and the Talbot open-hearth furnace on the South Side will be placed in operation about the middle of May. A new blooming mill will also be erected this summer with a capacity of about 2,500 tons daily.

The plant of the S. Severance Spike Works, Glassport, Pa., is to be practically doubled in size by the erection of an addition equal in size to the main building. An addition will also be built to the machine shop.

The American Sheet Steel Co. has decided to add two sheet mills to the Falcon plant at Niles, O. The Old Meadow plant, Scottdale, Pa., will also be improved by the addition of labor saving machinery and devices.

The Verona Tools Works, of Pittsburg, was made defendant in a patent suit commenced by Pettebone, Milliken & Co., of Chicago, an infringement on a device for bending rails being alleged.

The Kinzer & Jones Mfg. Co., Pittsburg, will dismantle its foundry on Penn avenue, and will go out of business entirely.

Furnace A of the Edgar Thomson plant of the Carnegie Steel Co., which has been operating on ferro-manganese, is now running on Bessemer. This change was made owing to the scarcity of Bessemer iron at all the steel plants of the company.

General Industrial Notes:—

The foundry of Henry T. Merriam, at Millbury, Mass., has been sold to a stock company of which W. A. Oakley, of Worcester, Mass., is the promoter.

The plant of the Automatic Gas Engine Co., Oil City, Pa., was sold to J. B. Smithman of the same place at receiver's sale last week for $45,000.

The blast furnaces of the Minnequa works of the Colorado Fuel & Iron Co., Pueblo, Col., are now under the management of R. H. Lee. Furnace A, while showing the irregularity of a new furnace, is making an average output of 375 tons a day. With one stove off, furnace B is averaging 240 tons a day. Two of the stoves on furnace C are being relined and the furnace is running on spiegel of which it turns out 100 tons in 24 hours. Furnace D will be blown in in July if the engines are delivered at the time agreed on. Furnace C is to be rebuilt soon.

The buildings of the Holthoff Machinery Co., at Cudahy, Wis., are all completed and the installation of machinery is almost finished. Operations will commence about May 1.

The headquarters of the Jordan Mfg. Co. have been removed from Seattle to Tacoma, Wash., and offices have been established at 726 Pacific avenue. The company is incorporated with a capital stock of $200,000 and will erect a plant for the manufacture of a nut and bolt lock fastener.

Furnace No. 1 of the Ensley plant of the Tennessee Coal, Iron & Railroad Co., at Ensley, Ala., has been blown in, making five furnaces in operation at this plant.

The Gem Furnace, at Shenandoah, Va., recently purchased by the Allegheny Ore & Iron Co., is to be relined preparatory to placing it in operation again. The furnace was formerly owned and operated by the Empire Steel & Iron Co.

The first cast was made last week at the foundry of the Altoona Foundry & Machine Co., Altoona, Pa.

At a meeting of the stockholders of the Seaboard Steel Casting Co., Chester, Pa., held last week, directors were elected as follows: Joseph Wharton, I. H. Clothier, M. L. Clothier, W. C. Sproule, J. B. Roach, T. H. Savery, and J. H. Cochran. W. C. Sproule was re-elected president; I. H. Cochran, secretary and treasurer, and S. E. Sproule, general manager.

The plant of the Baldwin Mfg. Co., South Connellsville, Pa., has been sold to J. C. Kurtz for $38,500.

The Bass Foundry & Machine Co., of Ft. Wayne, Ind., is building for the American Tin Plate Co., to be installed in the plant at Elwood, Ind., a cross-compound condensing Corliss engine, 30 and 56x60, also a 28 and 54x60 cross-compound for the Laughlin works of the same company at Martin's Ferry, O. The Bass company is also building a 30x48 heavy duty rolling mill engine for the American Sheet Steel Co.'s McKeesport, Pa., plant; also two 28x60 and one 28x48 heavy duty rolling mill engines with rope wheels, jack shafts and pillow blocks for the McKeesport Mfg. Co., McKeesport, Pa. It has a contract with the Colorado Fuel & Iron Co. for two 24-foot and two 10-foot rope wheels, each grooved for 52 2-inch ropes. These wheels will be built in four sections, each section in halves. Included in this contract are also jack shafts and pillow blocks.

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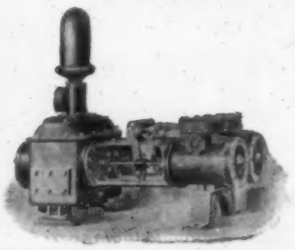

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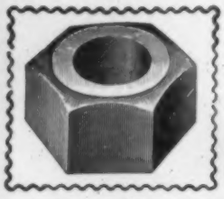

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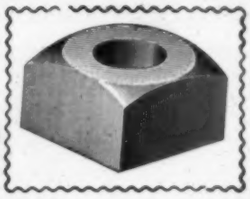

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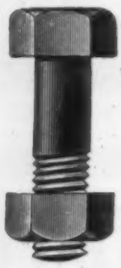

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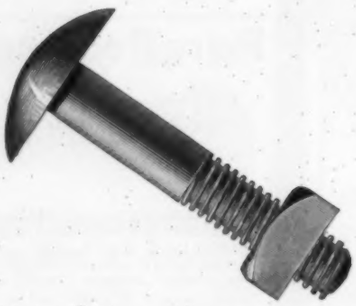

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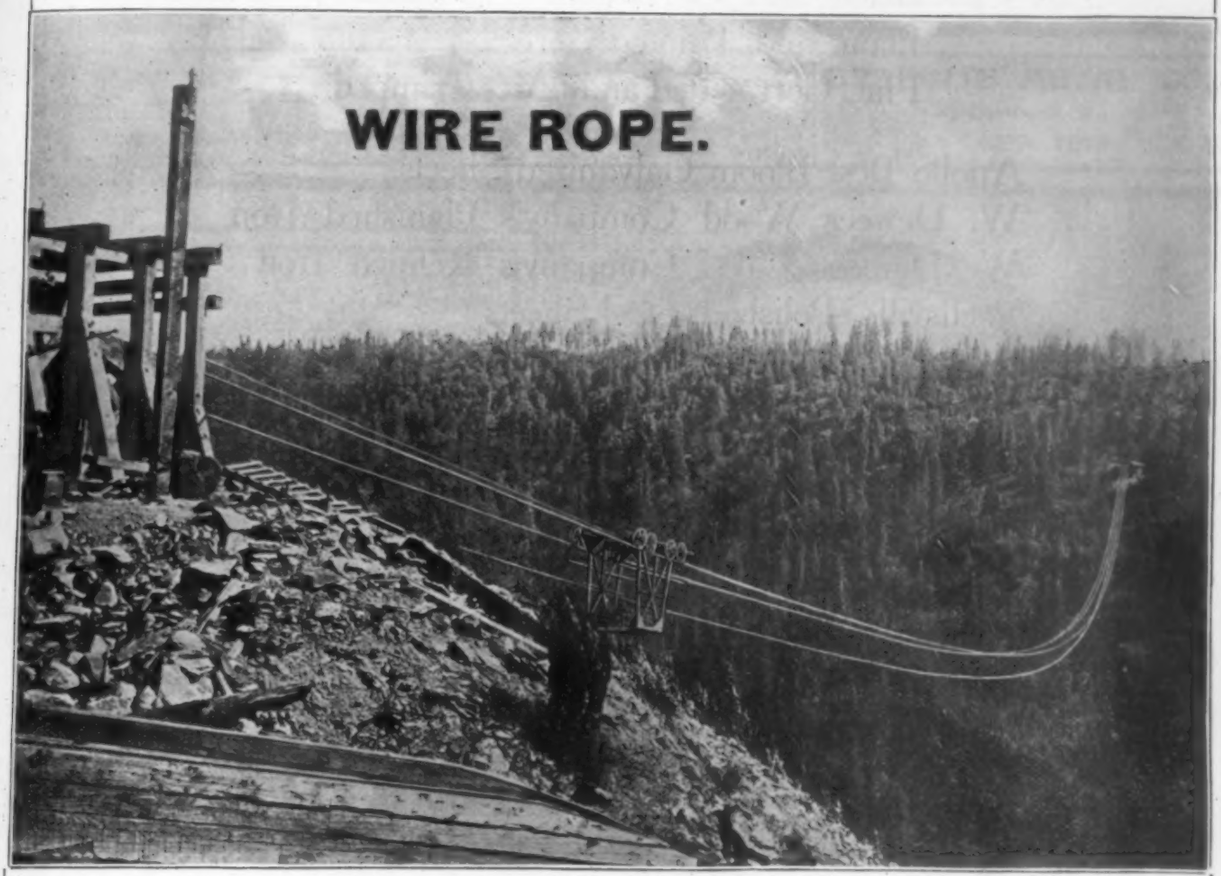

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